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THE JOURNAL OF

# THE INSTITUTION OF PRODUCTION ENGINEERS

Vol. 30, No. 12, December 1951

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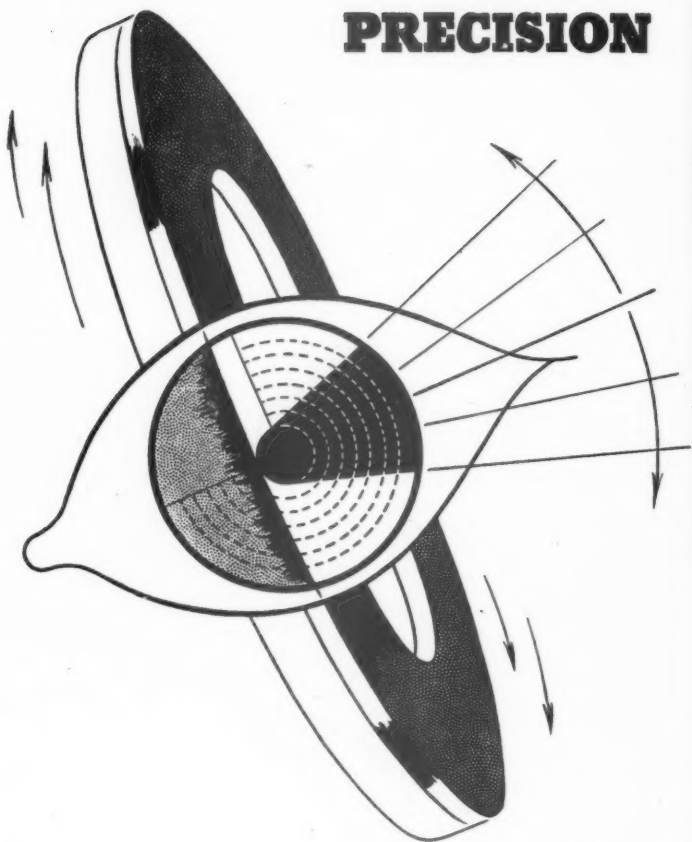
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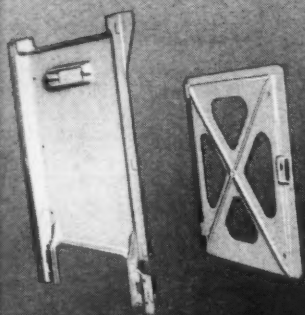
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OPERATION**

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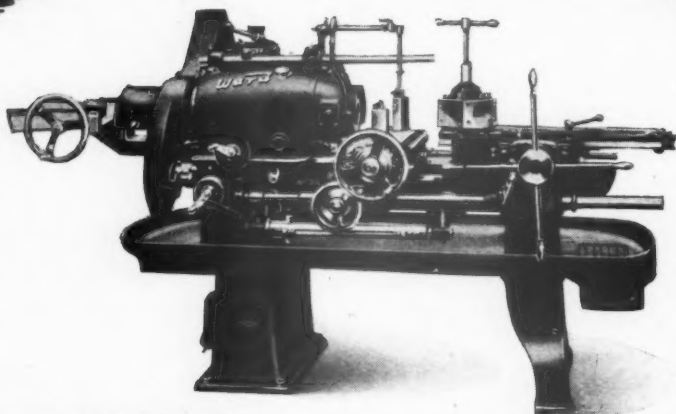


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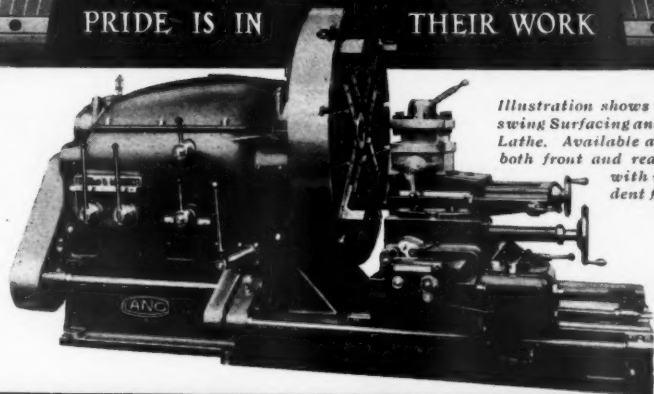
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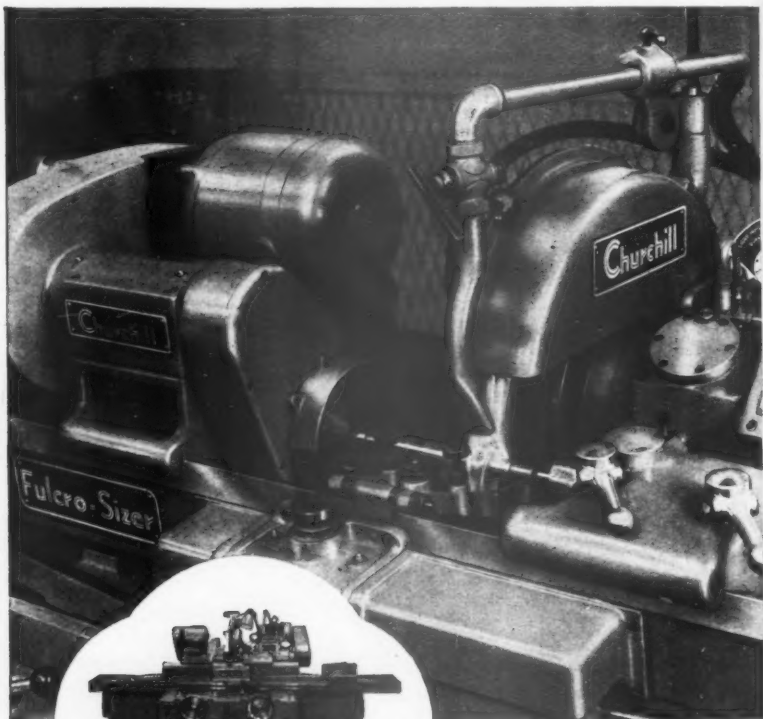
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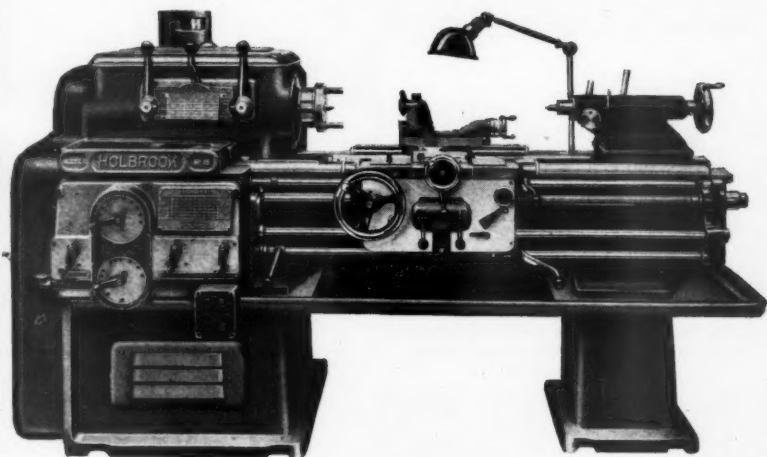
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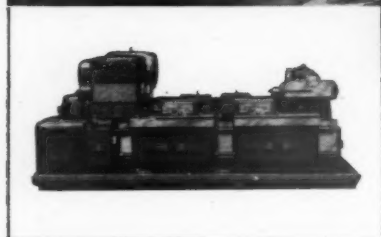
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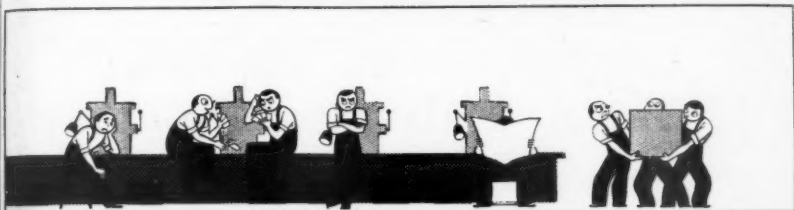
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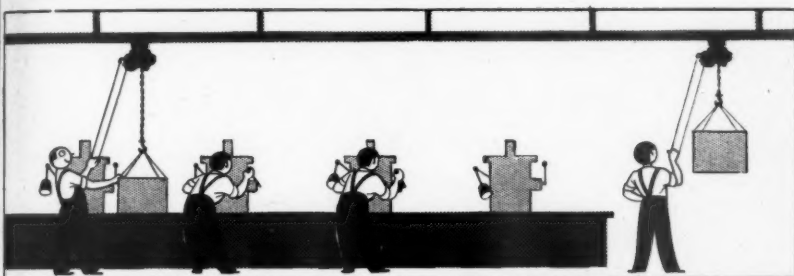
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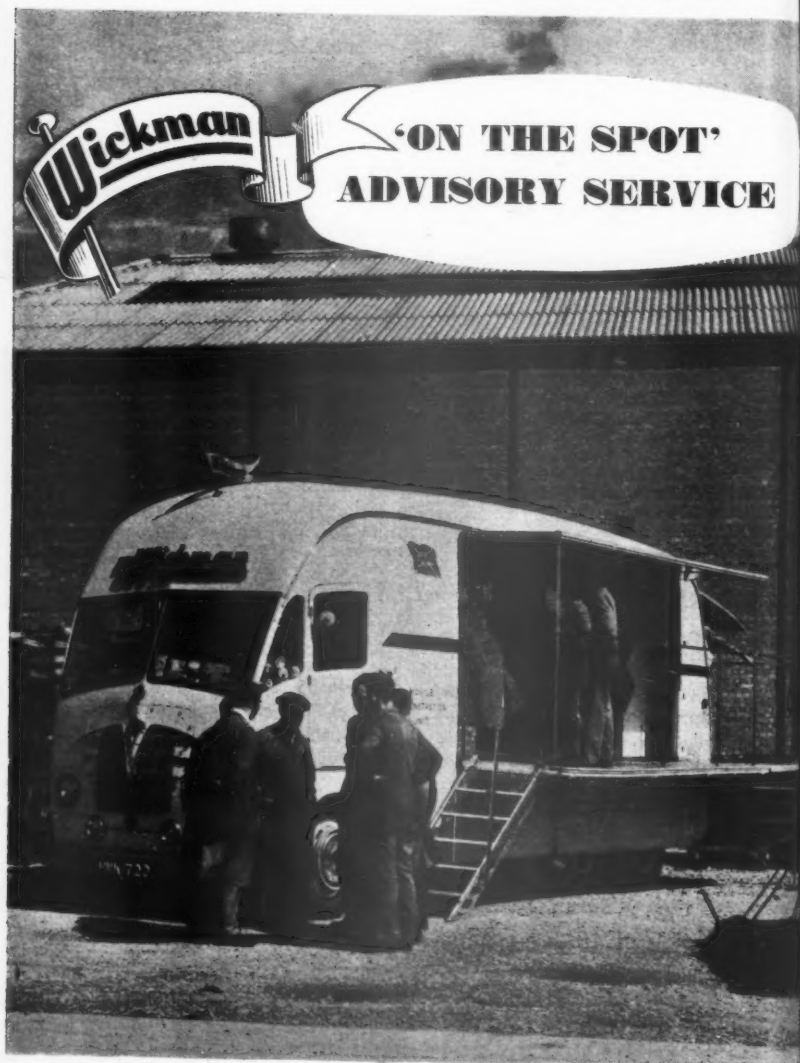
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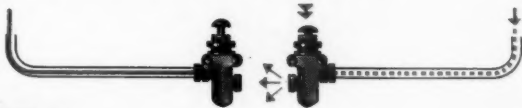


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# THE INSTITUTION OF PRODUCTION ENGINEERS

Vol. 30, No. 12, December 1951



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## INSTITUTION NOTES

December, 1951

### **PRESIDENT'S VISIT TO UNITED STATES**

The President has accepted an invitation from the Economic Cooperation Administration to represent the Institution at the first International Management Production Mission and the first International Conference of Manufacturers to be held in America from December 2nd/5th.

The purpose of the Conference is to enable leading industrialists of the United States, Britain, and Western Europe to secure a better understanding of each others problems, and to discuss the promotion of higher productivity.

### **CHRISTMAS 1951**

The Institution Head Office will be closed for the Christmas Holiday on the 25th, 26th and 27th December.

### **MEMBERSHIP RECORDS:**

In order to ensure that Membership Records maintained at Head Office are accurate, it would be greatly appreciated if members would keep the Records Section advised of any changes of address or business appointment. It would also be helpful if members would forward personal information regarding honours, academic degrees and membership of other Institutions.

### **EDUCATION OFFICER'S NEW ADDRESS**

Members are asked to note that Mr. T. B. Worth has now left his Birmingham address and in future may be contacted at : Odd Cottage, Chapel Lane, Farthinghoe, Northants.

### **COURSE ON ENGINEERING METROLOGY**

A short course on Engineering Metrology has been arranged by the University of Durham, King's College. Particulars are as follows :—

*Wednesday*, 5th December, at 7 p.m.

Introduction.

Professor A. F. Burstall, D.Sc.,  
Ph.D., M.I. Mech.E., F.I.I.A.  
T. R. Oakley, Metrology Division,  
National Physical Laboratory.

Introductory Lecture.

*Thursday*, 6th December, at 7 p.m.

"Manufacture of Gauges and  
Measuring Instruments."

H. B. Perry, A.M.I. Prod.E.

*Friday*, 7th December, at 7 p.m.

"Measurement and Inspection  
of Gears and Gear Generating  
Cutters."

Professor W. A. Tuplin.

*Saturday, 8th December, at 9.15 a.m.*

"Surface Finish."

R. E. Reason, A.R.C.S.

*Saturday, 8th December, 11.15 a.m.*

"Interferometry."

Dr. T. A. Littlefield.

The fee for the Course is £1 1s. and enquiries should be made to :  
F. Robinson, Esq., M.I.Prod.E., Mechanical Engineering Department,  
King's College, Stephenson Building, Claremont Road,  
Newcastle-upon-Tyne, 2.

### NEWS OF MEMBERS

Mr. F. W. Cooper, B.Sc.Eng.Hons., Member, Head of the Engineering Department of the Chance Technical College, Smethwick, has been appointed Principal of the College with effect from the 1st January, 1952.

Commander (E) S. Dickinson, O.B.E., Member, has been appointed Head of the Department of Engineering at the College of Arts, Science & Technology, at Ibadan, Nigeria.

Mr. E. P. Edwards, Member, Sales Manager of the Lapointe Machine Tool Co., has been elected to the Board of that Company.

Mr. J. K. Fisher, Associate Member, is now engaged as Works Manager with William Sugg & Co. Ltd., Westminster.

Mr. J. O. Garvie, Associate Member, is now Progress Engineer with E. D. Badger & Sons (Gt. Britain) Ltd., London, S.W.11.

Mr. F. Hallworth, Associate Member, is now an Engineer III with the Ministry of Supply at the Royal Ordnance Factory, Manchester.

Mr. F. Hancock, Associate Member, is now employed as Designer at the Admiralty Development Establishment, Barrow (A.D.E.B.).

Mr. W. Manson, Member, of Barr Thomson & Co. Ltd., has been appointed Managing Director of that firm.

Mr. F. Ralphson, Associate Member, is now Machine Shop Superintendent with Short Bros. & Harland, Belfast.

Mr. F. L. Brodie, Graduate, is now an Assistant Production Engineer with Rotherman's Ltd., London.

Mr. R. A. R. Coutts, Graduate, is Assistant Works Manager in the Rolled Sections and Pressings Division of the Ayrshire Dockyard Co. Ltd., Irvine.

Mr. C. Gledstone, Graduate, has taken up an appointment with the Liverpool Education Committee as Evening Class Lecturer in Work Study.

Capt. F. H. Treglown, Graduate, has been appointed Technical Sales Engineer with the Emco Brass Manufacturing Co. Ltd., Croydon Airport.

Mr. L. Walker, Graduate, is now Works Manager with T. Rowbotham & Co. Ltd., Stockport.

Mr. E. G. Woodhall, Graduate, has taken up the post of Development Engineer with Ewatts Ltd., Dudley.

**BRITISH STANDARDS:** The following Standards have recently been issued, and may be obtained post free at the prices stated, from the British Standards Institution, 24-28, Victoria Street, Westminster, London, S.W.1 :—

- 537 : 1951 Lancashire and Cornish Boilers of Riveted Construction (6/-)
- 607 : 1951 Horizontal Multitubular Boilers of Riveted Construction (6/-)
- 949 : 1951 Screwing Taps (15/-)
- 1767 : 1951 Grommets for General Purposes (2/-)

### HAZLETON MEMORIAL LIBRARY

*It would be helpful if, in addition to the title, the author's name and the classification number could be quoted when borrowing books.*

### ABSTRACTS

#### 534-3 VIBRATIONS

**"Theory of Vibrations for Engineers"** by E. B. Cole 2nd rev. ed. Crosby, Lockwood & Son, Ltd., London, 1950. 334 pages. 18/-

This second edition has been completely revised and rewritten. To all engineers and students this book could serve as an introduction to more serious study of the problems involved with vibration. An elementary knowledge only of the calculus is assumed, and detailed explanations of all advanced mathematical calculations are given.

The book commences with a chapter on S.H.M. and follows with chapters on natural vibrations of systems with one and several degrees of freedom. Further detailed chapters include damped and forced vibrations, engine vibrations, elimination and absorption, the effect of dynamic loads, transverse vibration of beams and the whirling of shafts.

The whole work is prepared with great detail for elementary study and includes 124 diagrams. The author shows preference for employing the vector method of solution to various differential equations with advantage. Each section of the book includes a wide variety of typical examples based on examination requirements, many of which are completely worked out. The aim of all the examples is to develop the principles involved and to minimise mathematical calculations. Answers to all problems are given.

#### 513 GEOMETRY

**"Practical Geometry and Engineering Graphics"**—A Textbook for Engineering Students by W. Abbott. 5th Ed. Blackie & Son, London, 1951. 326 pages, illustrated. 16/6d.

Dr. Abbott's book has been issued as a Fifth Edition, and commends itself to Students in the Degree and H.N.C. Courses. The work is divided

into two main sections and 19 chapters, each closing with related examples to those in the text itself.

Part I deals with Plane Geometry and Engineering Graphics covering elemental work on scales, Euclian triangulation—such as construction of triangles from certain data, triangles in perspective, etc.; and dealing with circles and lines in contact, conic sections and roulettes and glissettes, cycloids and trochoids and leading up to Harmonic Motion. Cams, and the various motion/time diagrams associated, lead up to a chapter on Graphical Integration which includes examples, particularly the Resistance Curve and Effective Work curve construction data therein.

Structural engineers will be interested in the author's work on Centroids and Moments of Area which precede the chapters on Graphic Statics. Statics is illustrated through selected S.F./B.M. diagram construction instructions, including cases of buoyancy and weight curves suitable for the shipyard apprentice to attempt. Builders' draughtsmen using the method of sections for frame analysis will find Chapter 8 of especial help, and the steelwork detailer will find particular appeal in the three-hinged arch illustrated solutions. Influence lines of several types of loading close this chapter.

Harmonic Analysis closes Part I and gives the reader a grasp of Fourier's Theorem.

Part II deals with Solid Geometry, Line Traces, Methods of Projection, Sections through Solids, Projections of a Line and Isometric Projection lead the reader to Plane Figures, Surface Intersection, Developments and Perspective Drawing, closing with Solids in Contact and Projection of Shadows.

#### 621.791 WELDING

"Welding Review Year Book, 1951" edited by J. V. Brittain. *Engineering Trader, Ltd., London. 340 pages, illustrated, diagrams.*

The technical scope of this book is wide, covering spot welding techniques with a useful digression into the economics of wire welding and stitch methods, condenser discharge welding, resistance welding, brazing, "Argonarc" welding, electrodes and machines for welding, and the oxyacetylene techniques. The chapter on Seam Welding provides data on control equipment, viz. Modulator and Ignition Control, while the section on Flash Butt Welding includes a table of weld area-time-current relationship for a range of common articles. The condenser discharge method of pressure welding "difficult" aluminium alloys is reported in the section on projection welding, as are other methods of dealing with sheet aluminium jointing.

Three-phase resistance welding, particularly with regard to Sciaky Balanced Load machines, is analysed together with the G.E.C. method of cold welding, the subject matter of which includes photographs of recent unions carried out by the process. The data on arc welding is both theoretical and practical. Arc characteristics and machine load volt/current characteristics are given consideration alongside information on multi-operator sets, high frequency ionising units and power factor correction condensers. Modes of attack most likely to yield good welds for a wide range of ferrous and non-ferrous materials are given, together with précis of properties of each metal likely to be of value to the welder.

There is in table form a section of 54 pages of essential features affecting weldability of a wide range of metals. Gas welding is also itemised in terms of technique to use to weld successfully the usual metals in both sheet and bar or cast form. An exposition is given of the recently introduced "Argonarc" process and of the construction of acetylene generators. Cutting steels using oxygen cutters both stationary and portable are briefly surveyed, as is the "Oxyarc" process of cutting. The book concludes with short articles on X-ray flow detection, stud welding, resistance welding electrodes, and protective equipment for operators.



**658.83 MARKETING**

**"Market Research"** by Paul Redmayne and Hugh Weeks. 2nd ed. rev. and rewritten by R. N. Wadsworth and B. D. Copland. *Butterworth, London, 1951. 195 pages, diagrams.*

The second edition of this book is a complete revision of that published under the same title by Paul Redmayne and Hugh Weeks in 1931. It deals in a straightforward way with research in supply and demand, and shows the use of sales analysis in ascertaining the likely consumer market. The contents include Sales Statistics, Dealer and Distribution Research, Sampling and Consumer Surveys, Advertising and Product Research. In the chapter dealing with the Charting of Sales Statistics, practical examples are shown of the use of bar, pie, and pictorial charts and graphs which give a quick appreciation of the current state of sales.

**621.74 FOUNDRY WORK**

**"Fundamentals in the Production and Design of Castings"** by Clarence T. Marek. *Chapman & Hall, London (Wiley, N.Y.), 1950. 383 pages, illus. diagrams.*

A comprehensive book which covers all the aspects of casting production from the raw materials to the final testing for flaws. The properties and composition of the sand and metals used are discussed, and attention is paid to the economic designing of patterns and cores.

The book has sections devoted to typical layouts for casting production, cleaning and inspection, grinding, production planning, melting of cast metals, equipment required, and handling methods. A special chapter covers production planning. Elementary principles of metallurgy are dealt with and the text is amplified by many drawings and photographs.

**621.882 SCREWS; SCREW THREADS**

NATIONAL PHYSICAL LABORATORY, Teddington, Middlesex.

**"Gauging and Measuring Screw Threads."** *London, H.M.S.O., 1951. 109 pages. Illustrated. Diagrams. 5/-.*

(Notes on Applied Science No. 1.)

This official publication is a new edition of the booklet formerly known as "Notes on Screw Gauges." It is the first of a series of handbooks, which will be published by H.M.S.O. under the general title of "Notes on Applied Science," and describes officially approved methods for measuring plug and ring gauges for both parallel and taper threads.

The text and illustrations from the earlier editions have been brought up-to-date and improved where necessary. In particular the nomograms have been printed larger than before. The additions include information on the measurement of tapered thread gauges and much additional information on the measurement of screw ring gauges.

Several special instruments of recent N.P.L. design are described, amongst which are machines for measuring drunkenness of threads and the pitch of large taper screws.

The appendices include a table of symbols agreed at the 1945 Ottawa Conference and data on the Unified thread, together with many tables of information on older established threads.

The text is illustrated with seven half-tone plates and sixty-two line drawings.

**REVIEWS**

**"Industrial Sociology"** by Delbert C. Miller and William H. Form. *Harper & Brothers, New York. 880 pages.*

This book which claims to be an "Introduction to the Sociology of Work Relations" has as its theme the mutual interdependence of personal satisfaction and efficient production.

In the first of the five parts into which this book is divided the authors have defined their field.

The second part is a survey of the organisation of American industry and the social structures both within and without the "Work Plant." A detailed analysis is made of the pattern of formal and informal relationships which can and usually do exist. Worker-Management, Worker-Group and inter-Group reactions have been extensively studied and supplementary statistics quoted.

Part Three deals with problems of worker placement and, in addition to interviews and the usual psychological tests, lays stress on the importance of sociometric tests in establishing the worker's suitability for membership of a particular working group. It is brought out that success in building and maintaining an effective team depends very largely on good "job specification" and selection with an adequate system of communication within a clearly defined organisation.

The progressive social development of the worker through the home, school and work environment is dealt with at length in part four. The authors have considered the implications of a generally improved standard of education and consequent effect on the level of expectancy and achievement.

Part Five deals with the impact of industry on the community and society, with special reference to the increasing size of organisations.

This book is well-provided with references to supplementary reading matter and has a detail of laboratory and field work invaluable to the student. It can be regarded as a reference book for persons interested in the study of Industrial Sociology.

Jennings, J. **"Mathematical Solution of Engineering Problems."**  
*Lon., Spon., 1951. 208 pages. (Spon's mechanical engineering series.)*

"Mathematical Solution of Engineering Problems" is not a text book in the accepted sense, but rather a series of treatments of a variety of problems, chosen from mechanical, civil, and production engineering. The treatment is such as to make the book useful to those who have gained a knowledge of basic mathematics, and who are faced with the solution of practical problems.

Considerable attention is given to the value of methods of approximation and to a logical approach to the arrangement of relative facts. Much of the work covered will be of particular interest to Production Engineers. The chapters on Alignment Charts and Statistical Methods in Engineering are important in this respect, though in the first case, the examples could with advantage have included those more specific to problems of production engineering, where alignment charts prove so useful.

Care should be exercised in a study of this book, lest the method outlined be assumed to be the best in all circumstances. The author is aware of this, and indicates that the method shown may prove the "best way" where others lead to complex expressions difficult to manipulate or involving long arithmetic processes.

The book should prove helpful to those with a fair knowledge of Algebra and Trigonometry, and some familiarity with the processes of differentiation and integration. It will, no doubt, prove a valuable source of example and application to teachers as well as students, and it has an equal appeal to the practising engineer.

It is refreshing to find that valuable space has not been given to the inclusion of standard mathematical tables which are so much more convenient when provided separately. A short Bibliography is given and ample index to tables and problems is included.

## OTHER ADDITIONS

**331.1 PERSONAL MANAGEMENT**

Fraser, John Munro. "**Handbook of Employment Interviewing.**"  
*London, Macdonald & Evans. 1950. 202 pages.*

**378.962 TECHNICAL COLLEGES**

British Institute of Management, London. "**Foremanship Training in Technical Colleges: Report of a B.I.M. Sub-Committee.**"  
*London, The Institute. 1951. 36 pages.*

**609. TECHNOLOGY—HISTORY**

Ducrocq, Albert. "**Destins Industriels du Monde.**" *Paris, Editions Berger-Levrault. 1951. 326 pages. Illustrated.*

**621.746 CASTING**

"**Die-Casting.**" *London, Machinery Pub. Co. [19—]. 2 vols. 64 pages. 66 pages. Illustrated Diagrams. (Yellow Back series.)*

**621.791 WELDING**

General Electric Co. Ltd., London. "**G.E.C. Cold Pressure Welding, Particularly as Applied to Aluminium.**" (2nd Ed. Rev.)  
*London, The Firm. 1950. 15 pages. Illustrated.*

Hilton, B. Richard. "**Welding Design and Processes.**" *London, Chapman & Hall. 1950. 342 pages. Illustrated. Diagrams.*

**621.793 METAL COATING**

Round, A. J. "**Electroplating and Metal Finishing Industry and the Epalox System.**" *Birmingham, B. J. Round & Sons Ltd. 1950. 30 pages.*

**621.86 MATERIALS HANDLING**

Fisher & Ludlow Ltd., Birmingham. "**Survey of Material Handling.**" (3rd Ed.) *Birmingham, The Firm. 1950. 36 pages. Illustrated.*

**621.9 MACHINE TOOLS; MACHINING**

Walker, W. F. "**Machining and Manipulation of Stainless Steels.**" *Manchester, Emmott & Co. 1950. 78 pages. Diagrams. (Mechanical World Monographs.)*

Woldman, Norman E., and Gibbons, Robert C. "**Machinability and Machining of Metals.**" *London, McGraw-Hill. 1951. 518 pages. Illustrated. Diagrams.*

Ward, Haggas & Smith Ltd., Keighley, Yorks. "**Milling Machines, Use and Maintenance.**" *Keighley, The Firm. 1942. 116 pages. Illustrated. Diagrams.*

Schatz, Artur. "**Hilfsbuch für das Raumen von Werkstücken.**" *München, Carl Hanser Verlag. 1951. 162 pages. Illustrated. Diagrams. (Werkstattkniffe, folge 13.)*

Norton Grinding Wheel Company Ltd., Welwyn Garden City, Herts. "**Facts About Grinding Wheels.**" *Welwyn Garden City, The Firm. [195—]. 69 pages. Illustrated.*

Ernst, Hans, and Martellotti, Mario. "**Metal Cutting, the Formation and Function of the 'Built-up Edge'.**" *Photoprint. Mechanical Engineering. August, 1935. Pages 487-498.*

Ward, Haggas & Smith Ltd., Keighley, Yorks. "**Universal Relieving Lathes: Operators' Handbook.**" (2nd Rev. Ed.) *Keighley, The Firm. 1946. 87 pages. Illustrated. Diagrams.*

**655.3 PRINTING**

Mackenzie, F. W., ed. "**Screen Process Printing, 1951.**" *Wealdstone, Middx., Skinner and Wilkinson. 1951. 80 pages. Illustrated.*

- 658.23 FACTORY LAYOUT, PLANNING**  
 Harman, H. M. "**Flow-line Planning in Factory Layout.**" Manchester, Emmott & Co. 1948. 32 pages. Diagrams. (Mechanical World Monographs.)
- 658.7 BUYING, STORING**  
 Bromell, John R. "**Effective Use of Wholesale Drug Warehouses.**" Washington, Gov. Pr. Office. 1947. 81 pages. Illustrated. Diagrams. (U.S.—Dept. Commerce—Industrial series No. 68.)
- Meserole, William H. "**Streamlined Grocery Wholesale Warehouses.**" Washington, Gov. Pr. Office. 1945. 96 pages. Illustrated. Diagrams. (U.S.—Dept. Commerce—Industrial series No. 18.)
- 659. ADVERTISING**  
 British Institute of Management, London. "**Advertising—a Tool for Management.**" Lond., The Institute. 1950. 33 pages. (Marketing and Sales Management series.)
- 669.71 ALUMINIUM**  
 Northern Aluminium Company Ltd., London. "**Heat Treatment of Aluminium Alloys.**" Lond., The Company. [195-]. 55 pages. Illustrated. Diagrams.
- 914.2 GREAT BRITAIN—DIRECTORIES**  
 "**Power Transmission Directory and Trade Names Index, 1950-1952.**" (8th Ed.) Lond., Trade and Technical Press Ltd. 281 pages.

**THE LIBRARY** Members are asked to note that until further notice the Library will not be open on Wednesday evenings or Saturday mornings, but will be open between 10 a.m. and 5.30 p.m. from Monday to Friday each week.

**JOURNAL BINDERS** Members are reminded that binding cases for the Journal are obtainable from Head Office, price 7/6 each post free. The cases, each of which will hold 12 issues of the Journal, are made of stiff board covered with imitation leather cloth, with gilt lettering on the spine.

**RESEARCH PUBLICATIONS** A number of copies of the following Research publications are still available to members, at the prices stated :

Report on Surface Finish, by Dr. G. Schlesinger	15/6
Machine Tool Research & Development	10/6
Practical Drilling Tests	21/-
Test Charts for Machine Tools, Parts 3 and 4	5/6 each

These publications may be obtained from the Production Engineering Research Association, "Staveley Lodge", Melton Mowbray, Leics.

INSTITUTION NOTES

**ISSUE OF JOURNAL** Owing to the fact that output has to be adjusted to meet requirements, and in order to avoid carrying heavy stocks, it has been decided that the Journal will only be issued to new Members from the date they join the Institution.

**IMPORTANT** In order that the Journal may be despatched on time, it is essential that copy should reach the Head Office of the Institution not later than 40 days prior to the date of issue, which is the first of each month.

## **GRADUATE ACTIVITIES**

### **LONDON GRADUATE SECTION**

#### **SECOND WEEKEND SCHOOL**

The Second Week-end School of the London Graduate Section took place from October 5th to 7th, 1951, at the Beatrice Webb House near Dorking. The theme of the School, which was presided over by Mr. R. Kirchner, M.I.Mech.E., M.I.Prod.E., President of the London Section, was "Means to Higher Productivity."

The proceedings commenced with a paper by Mr. L. E. Bunnett, A.F.R.Ae.S., M.I.Ec.E., an Assistant Director of Engineering in the Ministry of Supply. Mr. Bunnett, who has spent many years making investigations in different factories with a view to increasing productivity, called his paper "Time Saving on the Factory Floor as a Means to Higher Productivity," and dealt with the problem of higher productivity from the point of view of elimination of waste in many respects.

The second paper, entitled "The Contribution of Production Research to Higher Productivity" was read by Mr. K. J. B. Wolfe, M.Sc., A.F.R.Ae.S., F.R.I.C., F.I.N., M.I.Prod.E., Research Manager of the B.S.A. Group Machinability Research Laboratories and Chief Metallurgist of the B.S.A. Tools Group. Mr. Wolfe gave details of new materials and processes with which it is hoped to overcome the imminent shortages of some cutting tools caused by reduced supply of certain alloys such as tungsten, nickel, etc. He outlined some of the latest researches into the application of ceramic tipped tools which he felt might supersede carbide tools in popularity. Some of these ceramic tools and cutting tools treated by new metallurgical processes were exhibited.

Mr. H. F. Plaut, M.I.Prod.E., Director and Works Manager of Precision Grinding Ltd., read the third paper, on "The Approach to Manufacturing Problems Arising in a Medium Sized Precision Engineering Concern."

Mr. Plaut dealt with a number of organisational and managerial problems of higher productivity, and also outlined several ways of achieving higher productivity by means of technical improvisations. His paper was illustrated by many photographs.

Mr. W. Core, M.I.Prod.E., was in the Chair during the final discussion session.

Between lectures there were various kinds of entertainment, including two dances.

Mr. W. F. S. Woodford (Institution Secretary) and the Chairmen of the Birmingham and Coventry Graduate Sections (Mr. Alan Bradbury and Mr. George Key) were the guests of the London Graduate Section during the week-end, which from every angle can be regarded as a most successful venture.

## 1952 GRADUATE REPRESENTATIVES' CONFERENCE

The Organising Committee for the Second Graduate Representatives' Conference has now been formed, and consists of Messrs. Alan Bradbury (Birmingham Chairman), H. Peter Jost (1951 Conference President, London), Peter Spear (Birmingham), Bernard Stokes (Birmingham), and Warren Silberbach (Birmingham Secretary).

The Committee has requested all Graduate Sections to submit items for the Agenda for the Conference, which again will deal with matters relating to Institution organisation and policy as affecting Graduates.

## STUDY GROUP REPORTS

### 1 Coventry Graduate Section

The first Study Group Report published by a Graduate Section was that of the Coventry Graduate Section. It consists of two parts:—

- (1) A study of the formation of Study Groups, choice of subjects, presentation of facts, and the method of working.
- (2) A case study of a selected component in which such questions as consideration of machine selection and operating principles, methods of shop layouts, and fundamental costs consideration are dealt with in detail.

Whilst the Report on the whole makes good reading, the first part will be found of particular interest to Graduate Sections contemplating the formation of Study Groups.

### 2 London Graduate Section

This Report on "Principles of Materials Handling" was presented by the Materials Handling Study Group of the London Graduate Section at a meeting on 8th March, 1951.

It deals with the fundamentals of the application of materials handling in practice and includes chapters on floor layout, unit loads and effective machine utilisation.

The Report includes 18 photographs some of which contain ingenious ideas of materials handling, e.g. the use of a vacuum cleaner to collect small brass parts from a power press.

THE INSTITUTION OF PRODUCTION ENGINEERS

The utilisation of gravity is stressed throughout the Report which ends with the words "Remember, gravitational force is always 'on tap,' requires no maintenance and renders no accounts."

Both the above Reports may be borrowed from the Hazleton Memorial Library.



## INDUSTRIAL LAW AND THE PRODUCTION ENGINEER

by H. PETER JOST,\* A.M.I.Mech.E., Mem.A.S.M.E., A.M.I.Prod.E.

Presented to the London Graduate Section of the Institution,  
8th May, 1951.

*Note: This paper, revised by the author since presentation, in general refers to English Law only, but parts III, IV, and the Supplement are in the main applicable also to Scotland.*

### PRINCIPLES OF LAW

"INDUSTRIAL Law and the Production Engineer" is an introduction to those parts of the Law affecting Production Engineers and Managers in their daily work. It is not meant to present a complete or authoritative picture of the Law, nor should it be regarded as a legal textbook.

Its main purpose is to give an appreciation of the Law whose knowledge is always presumed. Its second purpose is to show that the Law is not just something turned out in Westminster on a conveyor belt system, but that the majority of the Laws affecting our daily lives have developed through custom.

It is the established policy of this Institution constantly to widen the outlook of its members; "Industrial Law and the Production Engineer," written by a practising Production Engineer and Manager for practising Production Engineers and Managers is, the author hopes, his contribution to this policy.

### PART I

#### INDUSTRIAL LAW

The constant growth of industry, and the inherent growth of Production Engineering, have extended the sphere of Industrial Law to such an extent that no responsible Production Engineer, whether acting in a technical, supervisory, or managerial capacity, can afford to ignore its influence on his everyday work.

Whether the Production Engineer as manager employs a person, or whether he himself is being engaged; whether he arranges production runs, or deals with unrest in the factory; whether he investigates accidents, or designs fixtures or machines, or whether he is being visited by the Factory Inspector, Industrial Law has a profound bearing on all these activities.

Yet whilst in practice, Industrial Law has become an important influence on the Manager's and Production Engineer's activities,

\*General Manager, Trier Bros., London

(Note: At the time of presenting this paper Mr. Jost was a Graduate of the Institution)

from a theoretical point of view it really does not exist. Puritan-minded lawyers deny its existence; they contend that what in everyday use is termed "Industrial Law" are merely applications to industry of certain recognised branches of the Law in general.

An analogy of the attitude of these lawyers may be taken to be that adopted by certain Mechanical Engineers, who, in spite of practical and unimpeachable evidence to the contrary, still deny the very existence of Production Engineering as an independent branch of engineering. Yet as, in order to understand Production Engineering, it is necessary to have a knowledge of the principles of Mechanical Engineering, so it is equally necessary to have a knowledge of the basic principles of the Law in general in order to understand and apply Industrial Law.

#### **ELEMENTS OF LAW**

Law, and this term includes all Laws, Acts, Legal Rules, decisions and practices, is divided by origin and development into **STATUTE LAW**, **COMMON LAW**, and **EQUITY**. By administration and purpose it is also divided into **CIVIL LAW** and **CRIMINAL LAW**. None of these divisions is watertight and overlapping takes place in many instances.<sup>1</sup>

#### **STATUTE LAW**

Statute Law, which forms the major part of Industrial Law as applied to the factory, is Law enacted by Parliament. The sovereignty of Parliament is (from a legal point of view) the dominant characteristic of our political institutions.<sup>2</sup> In fact, no limit is set to the powers of Parliament in the field of law making.

Law enacted by Parliament, i.e. Statute Law, takes precedence over all other forms of Law. It cannot be repealed or amended by Common Law or Equity; only Parliament itself can amend or even reverse its own Acts. No court or judge may refuse to enforce an Act of Parliament which, from a legal point of view, stands supreme; they can only administer or interpret it.

New, Amending, and Consolidating Acts of Parliament, Orders made in Council or by a Minister under the authority of an Act of Parliament (called Statutory Rules and Orders—S.R. & O.'s before 1948; and Statutory Instruments,<sup>3</sup> S.I.'s since), are all part of Statute Law.

Once an Act has been passed through its various stages in Parliament and has received Royal Assent, it becomes part of Statute Law and is administered by the authority laid down in the Act, e.g. the National Insurance Acts are administered by the

<sup>1</sup> In addition there are other forms of Law, e.g. Admiralty Law and Church Law, but they are usually of no concern to the Production Engineer.

<sup>2</sup> Dicey Law of the Constitution. 9th Edition.

<sup>3</sup> Statutory Instruments Act, 1948.

Minister of National Insurance ; the Factories Acts by the Minister of Labour and National Service (except certain of the health provisions which are administered by local authorities).

It often happens that after several amending Acts have been passed, Parliament decides to incorporate all these in a Consolidating Act. If, therefore, a Production Engineer wishes to acquaint himself with the latest version of any Statute Law (e.g. the Factories Acts), he must look up the latest Consolidating Act (i.e. The Factories Act 1937), any Amending Act passed thereafter (i.e. The Factories Act 1948), and all Statutory Orders and Instruments issued under their authorities. (See Appendices 3-16 of Supplement.)

**COMMON LAW** Common Law is the ancient law of the land as deduced from custom and interpreted by the judges.

In contrast to Statute Law it has "grown" rather than been "made." Also in contrast to Statute Law, Common Law cannot repeal or amend itself, and it has, therefore, happened on a number of occasions that large parts of Common Law, which through, say, changed conditions, had become unworkable, had to be abolished by Act of Parliament.

In legal theory, Common Law is not made but is only declared, and it is interesting to note that whenever a Court or the House of Lords, acting judicially, declares a Law, it is presumed to lay down what the Law is and was (and always has been), although it may have been misunderstood (or misapplied) in former days.<sup>4</sup>

Based mainly on the system of CASE LAW, whose principle is that decided cases are binding authorities for the future (for cases in which the same question arises), there is no Code of Common Law in this country. All English Courts ranking below the House of Lords are bound ABSOLUTELY by its decisions. Next below the House of Lords is the Court of Appeal whose decisions are binding declarations of Law not only for all lower Courts, but even for itself.

The rules of Common Law are found scattered over some thousand volumes of Law Reports, which is considered by many to make the Law extraordinarily cumbrous and difficult to learn and to apply. On the other hand, the system of Case Law affords unlimited possibilities of growth and detail not afforded by either Statute Law or by Codes of Law which exist in most countries outside the British Commonwealth. The fact that the law on a subject is embodied in a statute does not in any way prevent the growth of case law arising out of actions based on the statute.

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<sup>4</sup> Lord Davey (1907) in re Earldom of Norfolk H.O.L.

Another great advantage of Case Law is the fact that decided cases are binding for the future, for cases in which the same question arises, which makes it possible for people confidently to regulate their conduct upon the Law as declared.

An important function of Common Law practice is the interpretation of Statute Law. Whilst there are a few Statutory interpretations of Statute Law,<sup>5</sup> Common Law interpretations are predominant, e.g. if in the case of the Factories Acts, machines must be "SECURELY FENCED" or be in such "POSITION" or of such "CONSTRUCTION" as to be "SAFE," it is for Common Law to interpret what is meant by these terms, and once a decision has been made in a particular case, (e.g. a certain kind of fencing found to be not in compliance with the Acts,) this decision becomes part of the Law of the land.

#### EQUITY

The Rules of Equity are also Judicial Law.<sup>6</sup> They deal, *inter alia*, with Administration of Estates, Rectification of Written Instruments, Specific Performance of Contracts, Dissolution of Partnerships, Guardianship of Infants, and Redemption and Foreclosure of Mortgages.

In spite of their great importance, they afford little contact with the Production Engineer's daily work. A review of the basic constituents of the Law would, however, be incomplete without them, and so would the omission of the maxim that where the Rules of Equity and Common Law conflict, "Equity shall prevail."

The differences between Criminal Law and Civil Law are mainly those of purpose and administration. Briefly they are as follows :—

#### CRIMINAL LAW AND CIVIL LAW

*Firstly*, Criminal Law deals with offences against the community. It is based on the maxim that the community must be protected from the "antics of irresponsibility." To commit an offence against Criminal Law it is not necessary to injure any person, e.g. the fact that a dangerous machine is unfenced is, if proved, in itself a criminal offence, although nobody may have been hurt. Civil Law deals with injury (which need not be physical) suffered by one party at the hands of another. The offence is one against the individual and not the community. The maxim governing Civil Law is that all men are answerable for the natural and probable result of every one of their actions. Their legal liability may be established if they fail to consider the effect of their actions which would have been considered and foreseen by reasonable and prudent men.

*Secondly*, the purpose of Criminal Law is to punish the offender and to deter him from criminal acts and, by so doing, protect the community. The purpose of Civil Law is not to punish, but to aim at providing a remedy for the injured party.

<sup>5</sup> The Interpretation Act, 1889—52 & 53 Vict. C.63.

<sup>6</sup> Vide Supreme Court of Judicature (Consolidation Act 1925).

*Thirdly*, in the case of Criminal Law, it is, in most cases, the State which will set the Law in motion and be responsible for the cost of prosecution. In Civil Law the aggrieved party (the plaintiff) has to take this action.

*Fourthly*, Criminal Law once set in motion cannot generally be stopped. Civil Law procedures, on the other hand, can be abandoned, or compromised, practically at any stage before judgement.

*Fifthly*, whilst maximum penalties are laid down in the case of Criminal Law, awards at Civil Law may be unlimited.

It is of special interest to the Manager and Production Engineer that a particular act may be actionable at both Criminal and Civil Law, e.g. an injury to a workman resulting from the breakage of a chain which had not been annealed within the Statutory limits, may give rise to both Criminal and Civil proceedings against the employer, and perhaps the best evidence in a claim for damages in a Civil Court is proof that a conviction at Criminal Law in respect of the cause of the accident has been obtained.

## PART II

### HIRING, FIRING AND THE EMPLOYMENT CONTRACT

#### MASTER AND SERVANT

Every employment is a relationship which implies a contract or an agreement. The relationship between employer and employee governed by this contract is one of the *personal* relationships at law, viz. that of MASTER and SERVANT. Other personal relationships are those of PARENT and CHILD, HUSBAND and WIFE, etc.

The difference between the relationship of Master and Servant and that of Principal and Agent, or Independent Contractor, is that the Master HAS THE FULL RIGHT OF CONTROL OVER THE SERVANT.<sup>7</sup> This right of control, or interference, of being entitled to tell the Servant when to work (within the hours of work) or when not to work, or what work to do, or how to do it (within the terms of such service) are the distinguishing features of the Master and Servant relationship. This does not mean that the employer must or should interfere with the work of his employee, but it does mean that he has the legal right to do so.

In contrast to this, the Agent and the Independent Contractor undertake to perform a job or produce results, but, subject to special stipulations, the manner in which they perform the job or the time when they do it, are not within the control of their employers.<sup>8</sup>

Whilst the Agent, however, in general is not allowed, without express permission, to appoint Sub-Agents, the Independent

<sup>7</sup> *Performing Rights Society v. Mitchell* (1924) 1 K.B. 762.

<sup>8</sup> *Vide Egginton v. Reader* (1936) 1 All E.R. 7 and *Pollock* : Torts 14th ed. p. 64.

Contractor usually has complete freedom of action ; he can sub-contract unless such sub-contracting has been excluded when the contract was made.

Production Engineers, Shop Managers, General Managers, Secretaries, all fall within the Master and Servant relationship. Companies of Consultants called in to reorganise works would usually come under the heading of Independent Contractors.

The question whether a person is a Servant, an Agent or an Independent Contractor is one of fact of each individual case. A mere title may not necessarily fix a status, neither do express stipulations in the contract.<sup>9</sup>

**THE EMPLOYMENT CONTRACT**

Except in the case of contracts not to be performed within a year from the making,<sup>10</sup> contracts between Master and Servant need not be in writing, to be enforceable. It is, however, advisable that they should be, as difficulties might otherwise arise if, say in later years, a Court action is based on the terms of a verbal contract.

Written contracts of employment need not be specially drawn-up legal documents ; a series of letters is sufficient, provided they contain all the material terms, and even a "thank you" letter confirming an appointment may help in establishing a case.

The basic constituents of any contract are (a) offer, (b) acceptance, (c) consideration. (In addition, the contract must, of course, be legal and possible).

Both offer and acceptance must be unequivocal. An employer who qualifies his offer by the words "subject to satisfactory references," or an employee who, in accepting an offer made to him, adds the words "subject to final agreement on bonus," has no remedy if the other person discontinues the transaction.

An offer, which is, of course, a form of promise, can be revoked at any moment before it has been accepted. An employer offering a job to an applicant who said that he would consider the offer, may cancel his offer as long as it has not been accepted. If the cancellation is made by letter, the time of receipt, not that of posting, is the deciding factor. If the notice of cancellation arrives after the acceptance has been posted, then a legal contract exists, the promise having been converted into a legal obligation. This is the case even should the actual letter of acceptance be lost in transit.

On the other hand, if the letter of revocation arrives before the offer has been accepted, then the offer has no binding effect.

<sup>9</sup> Performing Rights Society *v.* Mitchell *supra*. Robinson *v.* Scarisbuck (1939) 32. B.W.C.C. 285.

<sup>10</sup> Statute of Frauds (1677) Sect. 4.

**CONSIDERATION** No contract of employment is enforceable at Law unless valuable consideration is given to the party making the promise.<sup>11</sup> Valuable consideration can be money (or promise to pay money) or promise to render service, or anything else that benefits the other party, e.g. board and lodgings, tuition or instruction, etc.

In the case of a contract of employment, payment of wages or salary (or the promise to pay) may be the valuable consideration for the promise to serve or to perform a job, and the promise of service (or the actual service) may be valuable consideration in return for the promise to pay wages or salary.

That consideration need not be money is shown in the case where a woman<sup>12</sup> used a remedy for influenza which was offered by the makers by advertising that they would pay £100 to anyone who used it for a specified period and contracted the disease. By taking the remedy and catching influenza during the specified period, she was held to have furnished valuable consideration for this promise, and the manufacturers had to pay.

The adequacy of consideration is no concern of the Law, which will interfere only when it is so small or so excessive as to give rise to presumption of fraud.<sup>13</sup>

**HIRING** The act of hiring, or the making of a contract of employment, is a bargain between the Master, or his representative, and the employee. As in a contract of purchase, the maxim of "buyer beware" applies. The Law does not demand special good faith, or full disclosure. Black spots in the past need not be mentioned<sup>14</sup> by either party, but deliberate untruths, or the giving of deliberate untrue impressions, are fraudulent and punishable by Law.

**TERMS OF EMPLOYMENT** Subject to certain exceptions provided by law, employer and employee are at liberty to arrange whatever terms they like. These terms may be either express terms, i.e. stated terms, or they may be implied terms, i.e. those not expressly included in the contract. To safeguard both parties all the terms should be express. The Courts will only recognise implied terms of a contract if they are satisfied that such terms are essential to the working of the contract, and that had both parties been asked to include the terms when the contract was made, they would have agreed to do so.<sup>15</sup>

<sup>11</sup> *Lees v. Whitcomb* (1828) 5 Bing 34.

<sup>12</sup> *Carlill v. Carbolic Smoke Ball Co.*, 1893, 1 Q.B. 256.

<sup>13</sup> *Gaumont British Pic. Corp. v. Alexander* (1936) 2 All E.R. 1866 and *Hitchcock v. Coker* (1837) 6 Ad. & El. 483.

<sup>14</sup> *Hands v. Simpson Fawcett* (1928) 44 T.L.R. 295.

<sup>15</sup> *Reigate v. Union Manufacturing Co.* (1918) 1 K.B. 592.



Terms of employment are often contained in a booklet issued by the employer, a copy of which has to be signed by the employee. It should, however, be said at this juncture that in a recent Court case,<sup>16</sup> it was held in the case of a man occupying a responsible position, in which the terms stated in this booklet were not appropriate to his position, and which he had never been asked to conform to, e.g. clocking-in, time-recording, meal times, use of cloakrooms, etc., that the staff rules were never expressly or by implication incorporated in his contract of service, although they may have been known to him in his capacity as Manager in control of the members of his staff who were subject to these regulations.

The terms of every contract of employment include recognised trade customs<sup>17</sup>; they also include Common Law and Statutory duties, e.g. the employer's Common Law duty to provide safe working conditions, a safe work place, safe plant and appliances, and a safe system of work; his Statutory duties to deduct P.A.Y.E. Income Tax, National Insurance, etc.; his duty under the Truck Acts to pay, subject to certain exceptions, wages or salary in money only and not in kind. They also include duties imposed, upon both the employer and employee, by the Factories Acts and various other Orders and Regulations.

Another important limitation of the terms is contained in the provisions of the "Industrial Disputes Order, 1951. No. 1376"<sup>18</sup> which, whilst not imposing on the employers a general requirement to observe recognised terms and conditions of employment, provides machinery for settling issues of this kind in respect of particular employers. It also deals with the settlement of disputes between an employer and his workers connected with their terms of employment or conditions of labour. Disputes dealing with either:—

- (a) the employment or non-employment of any person, or
- (b) the question whether any person should or should not be a member of a Trade Union, or
- (c) disputes between workers and workers

are expressly excluded from the provisions of the Order, which also specifies that any award made by the newly constituted "Industrial Disputes Tribunal" becomes an implied term of the contract between the parties.

No contracting-out of any terms imposed by Statutory Legislation is possible, and any term of contract, whether express or implied, which is contrary to, or inconsistent with, Statute Law, is invalid, though the validity of the contract may not otherwise be affected.<sup>19</sup>

<sup>16</sup> *Aris-Bainbridge v. Turner Mfg. Co.* (1951) 67 T.L.R. 47.

<sup>17</sup> *Marshall v. E.E.C.* (1945) 61 T.L.R. 186.

<sup>18</sup> S.I., 1951, No. 1376.

<sup>19</sup> *Kerney v. Whitehaven, Collins Co.* 1893. 1 Q.B. 700.



**DUTIES OF PARTIES**

The duties of Master and Servant are usually covered by the express terms of a contract of employment. A number of these, however, whilst usually not mentioned, are generally considered to be implied terms essential for the performance of the contract. Relating to the employee they are :—

- (1) *Obedience.* The Servant must obey all orders which the employer is entitled to give, according to the terms of the employment contract. If an employee refuses a lawful order he is liable to dismissal. However, he need not obey orders which would involve him in any danger not contracted for,<sup>20</sup> or that are inconsistent with Statutory Regulations, e.g., he need not work on an unfenced machine. It is a question of fact, not of Law, i.e. it is a question which a jury has to decide in respect of each individual case, whether an order is one which should be obeyed.<sup>21</sup>
- (2) *Honesty and Good Faith.* The Servant must faithfully and honestly discharge his duties. He must not accept bribes or any pecuniary reward from third parties whilst acting in his employer's business, and gifts must not be accepted, even if the employee believes that he is entitled to them, and that their acceptance does not cause him to act contrary to his master's interests.<sup>22</sup> The receipt of tips in certain classes of service is exempted from these considerations. No servant during his employment must do anything which may cause harm to his employer, his business and his interests. This duty applies also to his spare time, e.g. he must not do any work in his spare time for his master's competitors, or in competition with his master.<sup>23</sup>
- (3) *Personal Service.* The servant, unless he has special permission to do so, must not sub-contract any work given to him, but he must perform same personally.<sup>24</sup>
- (4) *Care and Efficiency.* Every employee must exercise reasonable care and must be efficient in doing his work. If guilty of negligence, he is liable to his employer, but errors of judgment do not generally make him liable. If he is not reasonably efficient at the job which he undertook to perform, and which entailed a certain amount of skill, he can be dismissed.

The decision in these matters is again a question of fact and not of law.

<sup>20</sup> *Bouzourou v. Ottoman Bank* (1930) A.C. 271.

<sup>21</sup> *Kaukul v. Anglo-Soviet S.* (1931) 41 Ll. L.R. 90.

<sup>22</sup> *Hovenden v. Milhof* (1900), 83 L.T. 41.

<sup>23</sup> *Hivac Ltd. v. Park Royal Scientific Instruments Ltd.* (1946), Ch. 169.

<sup>24</sup> *Vide Terry v. Variety Theatres, etc., Ltd.* (1928) 44 T.L. R242.

- (5) *Accounting.* Every employee must account to his employer for all monies, goods, or anything else received on behalf of, or for his employer. This includes all sums received from third parties, "secret commissions, gifts, etc."

An employer is entitled to any earnings of a Servant who works for another in his master's time.

- (6) *Secrecy.* A servant must exercise reasonable care in not disclosing anything which by its nature is confidential.<sup>25</sup>

Some of the duties of the employer may usually include the following :—

- (1) *Payment.* An employer's duty is to pay promptly the agreed wages or salary. Apart from certain deductions prescribed by Law, e.g. P.A.Y.E. and National Insurance Contributions, he must not deduct any part of the wages without the express permission of the employee, and even then such deductions must not infringe the provisions of the Truck Acts.

- (2) *Payment during Sickness.* Whether employees have to be paid during temporary sickness has not yet been satisfactorily settled, and different judgments have been given at different times.<sup>26</sup> Where the contract of employment contains no express terms relating to this question, the general position may be regarded as follows :—

- (a) If wages are paid hourly or daily or for some specific work, they are not payable during temporary sickness.
- (b) If wages are payable weekly or monthly, and there is no express contract, payment of wages—in the absence of special circumstances—may generally be regarded as being due.
- (c) If employment is on a long-term basis, payment during temporary sickness may generally be regarded as an implied term of contract, but again this is a question of fact and not of law.

The employer can, of course, give notice, but where payment has been established as a *right*, no deductions on account of National Health or Insurance benefits must be made.<sup>27</sup>

- (3) *Indemnity.* The employer must indemnify the employee to cover obligations and losses if these are incurred, or if the employee is put to expense on his employer's behalf.<sup>28</sup>

<sup>25</sup> *Bent's Brewery Co. v. Hogan* (1945) 2 All E.R. 570; and *Tournier v. National Prov. Bank* (1924), 1 K.B. 461.

<sup>26</sup> *O'Grady v. Soper* (1940) 3 All E.R. 527; and *Marrison v. Bell* (1939) 1 All E.R. 745.

<sup>27</sup> *Marrison v. Bell* *supra*.

<sup>28</sup> *Sheffield Corporation v. Barclay* (1905) A.C. p. 397.

- (4) *Provision of Work.* In the absence of express terms to the contrary, there is no need for the Master to provide work as long as he pays.<sup>29</sup> In general this rule is subject to two exceptions (a) where the nature of the service is such that the servant is thereby given an opportunity of increasing his reputation by publicity, (b) where the *Servant*, not Agent, is paid by commission.<sup>30</sup>
- (5) *Safety.* Every employer is responsible for the safety of his employees and must provide competent staff, adequate materials, and a safe system of work with effective supervision. He must also conform to all Statutory regulations.<sup>31</sup>

#### TERMINATION OF CONTRACT

If the duration of the contract is specified in the agreement, the contract automatically comes to an end by the effluxion of time. It also comes to an end when the contract is performed, by the death of either party, or, if a Company, by compulsory liquidation.

The two most common methods of termination of a contract are, however, TERMINATION BY NOTICE, and TERMINATION WITHOUT NOTICE.

In the case of termination by notice, the question of what the notice to terminate the employment should be, is entirely the concern of the two parties, subject however, to Statutory Restrictions, e.g. Industrial Disputes Order. Where no mention is made regarding the length of notice, "reasonable" notice will be assumed. What is "reasonable" notice, depends on the facts of each particular case.<sup>32</sup>

Trade customs are usually followed. It has been held that a Chief Officer in the Mercantile Marine was entitled to twelve months notice;<sup>33</sup> a Stationery Clerk in a Telegraph Company, to one month;<sup>34</sup> a Foreman paid on a weekly wage, to one week;<sup>35</sup> a Shop Manager, to one month;<sup>36</sup> an Engineering Salesman to three months.<sup>37</sup> In two cases decided in the recent past, it was held that a Sales Manager of an Engineering Works was entitled to six months notice;<sup>38</sup> and the General Manager of three small companies, at a salary of £10 payable weekly and £2 weekly for

<sup>29</sup> *Turner v. Sawdon* (1901) 2 K.B. 653 and *Davies v. Richard Johnson & Nephew* (1934) 51 T.L.R. 115.

<sup>30</sup> *Geo. Trollope v. Martyn* (1934) 2 K.B. 436 and *Geo. Trollope v. Caplan* (1936) 2 K.B. 387.

<sup>31</sup> See Parts III and IV.

<sup>32</sup> *Payzu v. Hannaford* (1918) 2 K.B. 348.

<sup>33</sup> *Savage v. B.I.S. Nav. Co.* (1930) 46 T.L.R. 234.

<sup>34</sup> *Vibert v. Eastern Telegraph Co.* (1883) Cab & El. 17.

<sup>35</sup> *Evans v. Roe* (1872) 7 C.P. 138.

<sup>36</sup> *Byrne v. Schott* (1883) Cab & El. 17 N.P.

<sup>37</sup> *Fisher v. Dick & Co.* (1938) 4 All E.R. 467.

<sup>38</sup> *Aris-Bainbridge v. Turner Manuf. Co.* supra.

expenses, to three months (in spite of the fact that although the man was called a General Manager, his position was, in the opinion of the Judge, only that of a superior clerk).<sup>39</sup>

Notice can be given at any period and need not be timed to expire at the end of a current week or month, unless so required by the terms of the contract. The requirements of notice are equally applicable to Master and Servant. Even in the case of a written contract, notice need not be given in writing, but contracting parties would be wiser to do so.

*Dismissal without Notice.* If one party to a contract acts in such manner as in effect to repudiate his obligation under the contract, then the other party can regard the contract as having come to an end, and thereupon is discharged from further performance of it.

If the employer does anything of this nature the employee can "walk out." Alternatively, there are a number of circumstances in which an employer is entitled summarily to dismiss a servant. Some of these are now discussed.

*Disobedience.* Provided an order is one which the employer is entitled to give, it must be obeyed even if it is unreasonable in the circumstances,<sup>40</sup> and disobedience justifies instant dismissal. Orders which need not be obeyed are those which subject the employee to unnecessary risks, or to dangers which were not contemplated by him at the time of employment. In fact, a servant who discovers that his employment subjects him to undisclosed risks is entitled to "walk out" and claim damages.<sup>41</sup>

*Neglect.* If neglect is habitual or serious, i.e. causes serious damage to the employer, it can be a reason for dismissal.

Forgetfulness has been held to amount to neglect, "to forget a thing which is of great importance you should remember, may well show a careless disregard for your master's interests, as amounts to neglect. Neglect as often arises from forgetfulness as from anything else, and if forgetfulness is with respect to an important thing, it may well be good grounds for the dismissal of a servant without notice."<sup>42</sup>

*Misconduct.* Misconduct includes acts of dishonesty in the service,<sup>43</sup> or breach of confidence in disclosing trade secrets,<sup>44</sup> or insolence coupled with violence, (though not necessarily an isolated act of insolence,<sup>45</sup>) or breach of confidence in promoting insubordination,<sup>46</sup>

<sup>39</sup> *Mulholland v. Bexwell Estates Co. Ltd.* (1950) 66 T.L.R. 764.

<sup>40</sup> *Turner v. Mason* (1845) 14 M.W. 112 and *Bouzourou v. Ottoman Bank* *supra*.

<sup>41</sup> *Robson v. Sykes* (1938) 2 All E.R. 612.

<sup>42</sup> *Baster v. London & County Printing Works* (1899) 1 Q.B. 903.

<sup>43</sup> *Cunningham v. Fonblanque* (1833) 6 C. & P. 44.

<sup>44</sup> *Beeston v. Collyer* (1827) 2 C. & P. 607.

<sup>45</sup> *Shaw v. Chairities* (1850) 3 Car. & Kir. 21.

<sup>46</sup> *The Marina* (1881) 50 L.J.P. 33.

or conduct which is prejudicial to the master's interests,<sup>47</sup> or using information obtained in the employment to the master's detriment,<sup>48</sup> or taking secret commissions.<sup>49</sup>

Misconduct outside the service may also be a reason for dismissal, though it must have a definite effect on the business.<sup>50</sup> Dishonesty in the service is always a ground for dismissal, even one isolated act.

*Incompetency.* If a servant fails in the skill which he professed to have when the contract of employment was made, he can be dismissed. The onus to prove incompetency lies with the employer, but where an employee has agreed to carry on his duties to the satisfaction of his employers, he has made them judges of his competency.

Persistent laziness justifies instant dismissal.<sup>51</sup>

It should be said at this juncture, that to prove incompetency to the satisfaction of a judge or jury may, in many cases, be very difficult.<sup>52</sup>

*Illness.* There are certain cases in which illness justifies dismissal. If one of the contracting parties is permanently unable to perform the duties imposed upon him, the contract may in certain circumstances be regarded as having come to an end. (It may be considered frustrated.)<sup>53</sup>

Such cases will mainly apply where the employee is engaged on a long-term contract, e.g. a Production Manager for, say, two years, or a Works Manager for, say, five years. The nature of the employment and the character of the services, the length of the employment and the duration of the absence are important points to consider. In general, however, the following maxim has been established, that "if the illness of a servant under an agreement was of such character as to indicate that the servant would never be able to perform his contract, and something had to be done at once to supply his place, the contract could be put to an end by the employer."<sup>54</sup>

There is, of course, nothing to stop an employer from terminating an employment during the absence of an employee through illness, by giving notice.

<sup>47</sup> *Drysdale v. New Era Co.* (1936) 55 Ll. L.R. 49.

<sup>48</sup> *Alperston Rubber Co. v. Manning* (1917) 116 L.T. 499.

<sup>49</sup> *Boston v. Ansell* (1888) 39 Ch. D. 339.

<sup>50</sup> *Tomlinson v. L.M.S.* (1944) All E.R. 537.

<sup>51</sup> *Lomax v. Arding* (1855) 10 Exch. 734.

<sup>52</sup> *Clouston Corry* (1906) A.C. 122.

<sup>53</sup> *Storey v. Fulham Steel Wks. Co.* (1907) 74 T.L.R. 89.

<sup>54</sup> *Ibid*

No reason need be given for dismissal. If a reason is given at the time of dismissal which is unjustifiable, and, later, another justifiable reason is discovered (even if unknown at the time of dismissal) this justifiable reason can be pleaded in a subsequent action.<sup>55</sup> The right to dismiss an employee is lost by the employer if he continues to employ the former after full knowledge of the facts, but there can be no condonation if there is any denial or concealment of the facts by the employee. In this case instant dismissal is again possible.

In all cases of dismissal without notice, the employer is under no legal obligation to pay for the period during which the employee has worked subsequent to the date when his wages last fell due.<sup>56</sup> Also when an employee improperly terminates his contract of employment, he is not entitled to any wages *pro rata* for the time worked since the date when they were last due.

In concluding these remarks on employment contracts, it should be stated that only points which the author considered to be of special interest to Production Engineers and Managers have been mentioned. No reference has been made to Restrictive Covenants, Duration of Contracts, and a number of other important subjects relating to the Law of Contract.

Good relations between employer and employee are, of course, of paramount importance. In fact, the best employment contract is one that is put away in one's desk and never looked at.

### PART III

#### FACTORY LEGISLATION

Statute Law as applied to the factory undoubtedly affords the largest area of contact between Industrial Law and the everyday work of the Manager and Production Engineer. In view of its importance it was, therefore, decided to prepare a Supplement, containing not only a summary of the most important provisions of present-day Factory Legislation, as applicable to the Manager and Production Engineer, but also a comprehensive list of current Statutory Orders (with their titles and numbers), whether made under the provisions of the Factories Acts or Acts preceding them, or whether made under Emergency Legislation.

The contents of this Supplement are on the whole self-explanatory. It is, however, felt that in the case of the section dealing with General Safety Provisions, i.e. certain special safety regulations excepted, the section which usually has the greatest bearing on the daily work

<sup>55</sup> *Boston Deep Sea Fish Co. v. Ansell* supra.

<sup>56</sup> *Ridgeway v. Hungerford Market Co.* (1838) 4 L.J. K.B. 157.

of the Manager and Production Engineer, it might be both helpful and informative, if a number of examples and Common Law interpretations were given. These are, therefore, presented in the following paragraphs. (Figures in brackets refer to page and paragraph numbers of Supplement.)

#### GENERAL SAFETY PROVISIONS

The approach to the General Safety Provisions by the Production Engineer and Manager must of necessity be one of alertness and caution. Three points must constantly be borne in mind :—

*Firstly*, that the duties regarding General Safety are **ABSOLUTE** i.e. they **MUST** be performed, for example, concerning the fencing of a machine the Law says : " If a machine cannot be securely fenced while remaining commercially practicable or mechanically useful, the Factories Acts prohibit its use."<sup>57</sup>

*Secondly*, that one of the provisions of the Factories Act provides that " on the Factory Inspector's application to Court, the latter may close down a factory, a department, a machine, or prohibit the use of a process."<sup>58</sup> (P.832 para.2).

*Thirdly*, that the Manager or Production Engineer himself, may be held liable, either together with, or in the place of, his employer, and if found guilty be subject to the same penalties as if he were the employer.<sup>59</sup> (P.832 para.4).

#### FENCING OF MACHINES

For the purpose of fencing of machines, the Factories Act 1937 divides machinery into three classes—

(a) Prime Movers, (b) Transmission Machinery, (c) Other Machinery, dealt with by Sections 12, 13 and 14 of the Act respectively. In each case it is stated that moving and dangerous parts must be securely fenced, or be in such a position, or of such construction as to be safe for every person employed or working on the premises. (P.836).

In the course of the years a number of Court cases have revolved around the meaning of these terms. This was clearly expressed by Lord Chief Justice Hewart : " It is to be observed that the words are ' securely fenced ' not ' somewhat securely fenced,' and a little later the word employed is ' safe ' not ' moderately safe.' *Safe* means actually *safe* and this actual safety is to be procured (a) by secure fencing, or (b) by safe position, or (c) by safe construction."<sup>60</sup>

The purpose of Factory Legislation is to protect the workers, and this protection is not confined to occasions when they do what they ought to do, or what they are told to do. In the words of Lord Chief

<sup>57</sup> Davis & Thomas Owen & Co. (1919) 2 K.B. 39.

<sup>58</sup> Factories Act, 1937, Section 40.

<sup>59</sup> *ibid* Sections 130, 136, 137.

<sup>60</sup> *Sowter v. Steel Barrel Co. Ltd.* (1935) 33 L.G.R. 376.



Justice Caldecote : " It is impossible to guarantee that workers will not be both foolish and reckless and the object of the Factories Act 1937 is to protect them against their folly and carelessness."<sup>61</sup>

To this should be added Lord Denning's remarks in a recent case : " The test whether parts of machinery are dangerous is whether they may reasonably be foreseen to be a source of injury to people who may be in the vicinity, taking them with all the *ordinary infirmities to which human nature is prone*. The occupier must realise that not everyone is careful, many are *hasty, careless or inadvertent* ; some are *unreasonable* or even *disobedient*. It may be unlikely that they will act in such a way, but it is not only the likely, but also the unlikely accident that the occupier must guard against. He must guard against all conduct which he might reasonably foresee."<sup>62</sup> (P.836 para. 9).

The application of this maxim was illustrated in a case<sup>61</sup> where a girl crawled under a drying oven in order to recover a tube, instead of using a brush which was supplied for that purpose. Whilst under the machine her hair was caught in a revolving wheel. The Court held that there had been a breach of Statutory duty by the employer. The dangerous part was not fenced and not in such a position as to be safe for everyone employed in the factory.

#### RECENT CASES

Two cases, in one of which an appeal to the House of Lords is waiting to be heard, and which involve two most interesting problems, deal with the question : " When is a machine a machine, and when is it a product ? " In the case of *Thurogood versus Van Den Berghs & Jurgens Ltd.*,<sup>63</sup> an electric fan used in connection with the manufacture of margarine was taken into a separate building, which was within the curtilage of the factory, but which was used solely for electrical, mechanical and carpentry work.

An accident occurred during testing, and an action based on Section 14 of the Factories Act was brought against the employers. The defence was based on that Section of the Factories Act 1937 which said that " a place within the curtilage or precincts forming a factory, but which is used solely for another purpose, may be treated as a separate factory " (P. 834 para. 1). It was contended that the repair shop was a separate factory in which the fan was not a MACHINE but a PRODUCT, and that no obligation, therefore, existed to fence it.

<sup>61</sup> *Wraith v. Flexible Metal Co. Ltd.* (1942) 2 All E.R. 549.

<sup>62</sup> *Smithwick v. National Coal Board* (1950) 66 T.L.R. 173.

<sup>63</sup> (1951) T.L.R. 557.



The Court of Appeal did not accept this view and held that the testing of machines (e.g. fans) used for making margarine was incidental to the work of making margarine and that, therefore, an obligation under Section 14 of the Factories Act had existed.

The Scottish case *Parvin versus Morton Machine Co.*<sup>64</sup> dealt with a different aspect of the same problem. This case revolved around an accident that occurred in the final stages of the manufacture of a dough-brake, and the question which arose here was "when does a product become a machine?"

The answer was given by Lord Strachan who pointed out that so long as a machine is in the course of construction or has not been finally adjusted or tested, there may have to be work done on it which could not be done with a fence or guard in position. He came to the conclusion that there was nothing in the Act which indicated that a machine in such circumstances should be fenced. His decision was affirmed by the Inner House.<sup>65</sup>

However, an appeal to the House of Lords is pending and the Law Lords' decision may exert a considerable influence on the work of Managers and Production Engineers, particularly of those engaged in the manufacture, reconditioning and repair of machines and machine tools.

#### UNFENCED MACHINERY

(P. 837 para. 2). The provisions regarding unfenced machines limit the work on or with these to three circumstances:<sup>66</sup> Examination, Adjustment or Lubrication, which must be done *immediately*, or *necessarily* when the part is in motion. The operative words in this case are "immediately" and "necessarily" and the terms **MUST** be used in their true sense. They do not mean "convenient," "practicable," "desirable," "advisable," "preferable," etc.

Neither cleaning nor trying out of tools and settings come under the headings of Examination, Adjustment, Lubrication, nor does the term Adjustment include tests made after adjustment.<sup>67</sup>

The only exception to the above rules is the mounting or shipping of belts in particular processes and in certain circumstances (See Supplement Appendix 1).<sup>68</sup>

#### SELF-ACTING MACHINES

Lastly reference should be made to Section 19 of the Factories Act 1937, dealing with self-acting machines, and specifying that no traversing part of any self-acting machine, or any material on it may run within a distance

<sup>64</sup> (1950) S.C. 371.

<sup>65</sup> *Parvin v. Morton Machine Co.* (1950) S.L.T., pt. 43, p. 297.

<sup>66</sup> Factories Act 1937—Section 15, vide S.R. & O. 1938, No. 641.

<sup>67</sup> *Nash v. High Duty Alloys Ltd.* (1947) 63 T.L.R. 146.

<sup>68</sup> S.R. & O. 1946, No. 156.

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<sup>68</sup> S.R. & O. 1946, No. 156.

of less than 18 in. from any structure, if any person is liable to pass through this space, whether in the course of his employment or not. (P.838 para. 3).

Whilst in the original form this provision was mainly to cover spinning machines, it now applies to all traversing machines.

Although the greatest offender against this regulation is undoubtedly the small shaping machine in the toolroom, Production Engineers, Managers, and Material Handling Engineers would be well advised to bear these provisions in mind when laying out materials handling and mechanical handling schemes.

#### PART IV

### EMPLOYERS' LIABILITY FOR ACCIDENTS AND INDUSTRIAL INJURIES

It has been seen in Part III that every employer has imposed upon him, by Statute Law, a wide range of duties, and that—if he fails to observe these—he is liable to an action at Criminal Law.

In addition to these Statutory duties, employers have also Common Law duties to their servants, and if a servant suffers damage as a result of a breach of the employment contract, or through his employer's negligence,<sup>69</sup> he can sue his master for damages. This Common Law aspect of an employer's liability has an important influence on the work of the Production Engineer whose commonsense, care, and knowledge of the Law may save his employers considerable trouble and expense.

The main difference between the Statutory duties already discussed and the employer's duties at Common Law, is that the former are ABSOLUTE in as much as they compel the employer to fulfil what is prescribed by Statute,<sup>70</sup> whereas the latter require only the exercise of "reasonable care" and "reasonable skill."

In the case of absolute obligations, liability is not generally dependent on negligence or practicability; all that is required in a civil action<sup>71</sup> based on breach of the employer's Statutory duties is (a) proof that there was a Statutory duty, (b) proof that this Statutory duty was not observed and (c) proof that damages were suffered as a result.<sup>72</sup>

In contrast to these absolute duties, the duties imposed by Common Law are fulfilled if the employer has taken "reasonable care" and used "reasonable skill." He is only liable if an accident happens through his negligence, which has to be proved.

<sup>69</sup> *Brydon v. Stewart* (1855) 2 Macq. 30 (H.L.).

<sup>70</sup> *Galashiels Gas Co. Ltd. v. O'Donnell* (1949) 1 All E.R. 319.

<sup>71</sup> *Cutler v. Wandsworth Stadium Ltd.* (1949) A.C. 398.

<sup>72</sup> *Viner v. Valdenberg* (1946) K.B. 50, *vide* *Lavender v. Diamints Ltd.* (1949) All E.R. 92.

**COMMON  
LAW DUTIES**

At Common Law, every employer is duty-bound to take REASONABLE CARE and to use REASONABLE SKILL :—<sup>73</sup>

- (a) to provide and maintain proper machinery, plant, appliances, and works.
- (b) to select properly skilled persons to manage and superintend the business.
- (c) to provide a proper system of working.

If he fails in these duties, he is liable for injury suffered by any employee through his negligence.

The question whether conduct is one of reasonable care or reasonable skill is one of fact, to be decided in each individual case. Three points of guidance have, however, been established.

- (a) If an employer does nothing to carry out his obligations and work is carried out in a haphazard fashion, e.g. there is no controlled system of work, or proper appliances have not been provided.<sup>74</sup>
  - (b) If he has been informed of a defect but has done nothing to remedy it.<sup>75</sup>
  - (c) If he does not know anything is wrong, but could have found out by the exercise of reasonable care,<sup>76</sup>
- he will be liable for any injury suffered thereby.

“Negligence may be either (a) where the employer knows and negligently fails to remedy, or (b) where he ought to have known but negligently fails in acquiring knowledge and therefore negligently fails to remove the danger or defect.”<sup>77</sup>

In the case where negligence consists of a fault of omission, the proof for the latter must be to show “either that the thing he did not do, was a thing which was commonly done by other persons in like circumstances,”<sup>78</sup> or “that it was a thing so obvious that no employer of ordinary prudence would have neglected to do it.”<sup>79</sup>

An illustration of the full extent of the maxim of “reasonable care” is given in the Paris case discussed later.

<sup>73</sup> *Wilson & Clyde Coal Co. Ltd. v. English* (1927) 53 T.L.R. No. 32, p. 944.

<sup>74</sup> *Williams v. Birmingham Battery & Metal Co. Ltd.* (1899) 2 Q.B. 338.

<sup>75</sup> *Clarke v. Holmes* (1862) 7 H. & N. 937.

<sup>76</sup> *Webb v. Rennie* (1865) 4 F. & F. 608.

<sup>77</sup> *Baker v. James* (1921) 37 T.L.R. 591.

<sup>78</sup> *Morton v. Dixon (William) Ltd.* (1909) S.C. 807.

<sup>79</sup> *Bristol Aeroplane Co. v. Franklin* (1948) W.N. 341.

**MACHINERY,  
PLANT,  
APPLIANCES  
AND WORKS**

An employer is not liable for any latent defect of plant and machinery which could not have been detected by reasonable care or skill.<sup>80</sup> He does not warrant the safety of his plant and machinery.<sup>81</sup>

Liability for defects after installation is usually established if a defect ought to have been discovered by regular inspection and maintenance,<sup>82</sup> or when it had been brought to the employer's notice.

There is no necessity for the employer to provide the latest improvements, but only to exercise due care and skill.

If, in the course of working, plant becomes defective and the defect is not brought to his notice, and could not by reasonable diligence have been discovered by him, he is also not liable.<sup>83</sup> Liability is, however, established by the total failure to supply the necessary plant, as in the case of a workman who was killed whilst climbing on an internal tramway for which no ladder leading to the platform was provided<sup>84</sup>; or that of the worker, who, in order to carry out an overhaul of boiler tubes, found planks himself and set up his own planking, which was unsafe and led to injury, the employer not having provided any planks at all.<sup>85</sup>

On the question of premises and appliances, an employer is bound to use reasonable care to provide safe premises and appliances for his servants to work in, and with, and to use reasonable care to keep them safe.<sup>86</sup> This obligation to take reasonable care extends not only to occasions when the workman is actually engaged on the employer's work, but on something incidental thereto, as was illustrated in a case,<sup>87</sup> where a woman worker stopped work and went to a tap to wash a teacup which she used for her own purposes. In doing so she passed a number of vats containing soluble oil. A duck-board was provided near the vats to enable the workmen to dip buckets into the vats to fill them with the liquid. It was the duty of the labourer from time to time to clean the floor or to put sawdust on it, and so prevent it becoming slippery from the liquid which splashed on to it from the buckets. The position of the duck-board permitted access to the tap. The woman slipped on the duck-board, which at that moment was in a slippery condition, and suffered injuries. The employer, on being sued, denied liability on the

<sup>80</sup> *Weems v. Mathieson* (1861) 4 Macq. 215.

<sup>81</sup> *Wilson & Clyde Coal Co. Ltd. v. English*, supra.

<sup>82</sup> *Webb v. Rennie*, supra.

<sup>83</sup> *Gavin v. Rogers* (1889) 17 R. (Ct. Sess.) 206.

<sup>84</sup> *Williams v. B'ham Battery & Metal Co.*, supra.

<sup>85</sup> *Lovell v. Blundells & Crompton & Co. Ltd.* (1944) 60 T.L.R. 326.

<sup>86</sup> *Cole v. De Trafford* (1918) 2 K.B. 523.

<sup>87</sup> *Davidson v. Handley Page Ltd.* (1945) T.L.R. 178.

grounds that the worker was not injured in the course of the work on which she was employed, but on something which she was not required or employed to do.

The Court of Appeal did not accept this contention: "A workman is not employed and paid to tie up his bootlace, nor is he employed and paid to quench his thirst. But it seems to me that it would be an extravagant result if the Common Law obligation of the employer suddenly came to an end at the moment the workman ceased to perform the precise acts which he was employed to perform, and did something which was ordinarily and reasonably incidental to his day's work."

The obligation of an employer extends to cover all such acts as are normally and reasonably incidental to the day's work of a workman.<sup>88</sup>

Liability as regards safe place of work has been established through the following causes: unsafe roofs,<sup>89</sup> unsafe walls,<sup>90</sup> slippery floors,<sup>91</sup> bad ventilation,<sup>91</sup> inflammable gas<sup>92</sup> and unsafe insulation.<sup>93</sup>

**COMPETENT STAFF** An employer is responsible for the competence of his staff. This responsibility is not absolute; it suffices if reasonable care is taken in the selection of competent staff.

In the case of a mine where an accident occurred through the presence of carbon monoxide, the employers were held liable under this heading, because neither the Manager nor the Foreman, though both qualified Mining Engineers, had any knowledge of the dangerous properties of the gases in these pits.<sup>94</sup>

**SYSTEM OF WORK** The majority of actions at Common Law involving the question of negligence in the factory, are concerned with the "System of Work." The meaning of "System of Work" may be taken as a general organisation according to which work is carried out.

"The System of Work includes, or may include, according to circumstances, such matters as the physical layout of the job, the setting of the stage, so to speak—the sequence in which the work is to be carried out, the provision in proper cases of warnings and notices, and the issue of special instructions. The system may be adequate

<sup>88</sup> Davidson v. Handley Page, *supra*.

<sup>89</sup> Patterson v. Wallace & Co. (1854) 1 Macq. 748.

<sup>90</sup> Brydon v. Stewart, *supra*.

<sup>91</sup> Wilson v. Merry (1868) L.R. 1 S.C. & Div. 326.

<sup>92</sup> Nimmo & Co. v. Connel (1924) 40 T.L.R. 522.

<sup>93</sup> Paine v. Colne Valley Electricity Supply Co. Ltd. & B.I.C. Ltd. (1937) 55 T.L.R. 181.

<sup>94</sup> Butler v. Fife Coal Co. Ltd. (1912) 28 T.L.R. 150.



for the whole course of the job, or it may have to be modified or improved to meet circumstances which arise ; such modifications or improvements equally fall under the head of system."<sup>95</sup>

It is not enough to lay down a permanent system ; the system must be capable of covering the various practical tasks which arise in the course of work.<sup>95</sup>

Examples of defective systems are faulty co-ordination of departments, where one may endanger the other, (e.g. a haulage system being run whilst workmen were leaving the pit ;<sup>96</sup> blasting operations carried out before the men had time to get away ;<sup>97</sup> a crane swinging stones over a cutting where men were working ;<sup>98</sup> a railway providing only one look-out man on a repair job on a busy line, where two should have been provided) ;<sup>99</sup> or, lifting tackle, quite suitable for one task, not being altered to meet the needs of the next one ;<sup>100</sup> planking not being supplied for a man to stand on during a boiler repair ;<sup>101</sup> not providing goggles in certain cases, even though there may be no duty under the Factories Acts to provide them ;<sup>102</sup> removing electrical safety screens when testing switchboards ;<sup>103</sup> employing workers on a crane without proper instruction ;<sup>104</sup> failure to instruct inexperienced workers ;<sup>105</sup> insufficient lighting in the vicinities of hatchways and similar dangerous places,<sup>106</sup> etc., etc.

**PARIS v.  
STEPNEY  
BOROUGH  
COUNCIL**

The latest major case<sup>102</sup> which clearly emphasised the extent of the employer's duty at Common Law, and which involved both the question of appliances and system of work, was that of *Paris versus Stepney Metropolitan Borough Council*. This case reiterated the maxim that each contract of employment is one between the *employer* and the *individual* workman, and that, therefore, the duty to take reasonable care is owed to the workman as an *individual* and not as a member of a group or class. The case also established a new maxim, viz. that in considering the question of reasonable care, not only must the *likelihood* of an accident be taken into account, but also the *consequences* should such accident arise.

<sup>95</sup> *Speed v. Swift & Co. Ltd.* (1943) 1 All E.R. 539.

<sup>96</sup> *Wilson & Clyde Coal Co. Ltd. v. English*, supra.

<sup>97</sup> *Sword v. Cameron* (1839) 1 Dunc. (Ct. of Sess.) 493.

<sup>98</sup> *Smith v. Baker & Sons* (1891) T.L.R. 679.

<sup>99</sup> *Dyer v. Southern Railway Co. Ltd.* (1948) 64 T.L.R. 225.

<sup>100</sup> *Speed v. Swift & Co. Ltd.*, supra.

<sup>101</sup> *Lovell v. Blundells & Crompton & Co. Ltd.*, supra.

<sup>102</sup> *Paris v. Stepney Borough Council* (1951) 67 T.L.R.

<sup>103</sup> *Barcock v. Brighton Corp.* (1949) 65 T.L.R. 90.

<sup>104</sup> *Gallagher v. Dorman Long & Co. Ltd.* (1947) 2 All E.R. 38 C.A.

<sup>105</sup> *Young v. Hoffman Manuf. Co. Ltd.* (1907) 23 T.L.R. 671.

<sup>106</sup> *Garcia v. Harland & Wolff Ltd.* (1943) 60 T.L.R. 16.



**THE CASE**

A workman, Edward John Paris, who had lost an eye in an air-raid (a fact which was known to his employers) was employed as a fitter's mate on the maintenance and repair of vehicles. At the time of the accident he was engaged in dismantling the chassis of a large vehicle on a ramp. Having removed the nuts from the U-bolt, he used a hammer to knock out the rusty bolt and in doing so, a fragment of metal was lodged in his good eye, which is in consequence now completely blind.

He sued his employers, asserting as his reason for doing so his employers' Common Law duty "to exercise reasonable care, no unnecessarily to expose him to the risk of suffering the injurious results likely to follow an accident to his sound eye, having regard to the fact that he was known by them to be a one-eyed man."

In the Court of Appeal,<sup>107</sup> the decision of the High Court Judge who had given judgment in his favour for £5,250 damages and costs, was reversed. It was held that as the employers did not owe any duty to their two-eyed employees to provide goggles for this class of work, and as the absence of sight in one eye in this case *did not increase the risk* of an accident happening, the duty owed to the one-eyed man was no greater than that owed to every other employee. "The greater risk of injury is not the same as the risk of greater injury," and only the former was held to be relevant.

The workman appealed to the House of Lords,<sup>108</sup> which restored the original judgment; and in doing so rejected the Court of Appeal's interpretation in respect of this case, of the Employer's Common Law duty to take reasonable care. In this case the maxim established by the House of Lords was that the *gravity of harm* which is likely to fall on the workman concerned *must be taken into consideration* where the question of liability is concerned.

Expressing this view, Lord Normand said that "if A and B, engaged on the same work, run precisely the same risk of an accident happening, but if the result of an accident will be more serious to A than to B, precautions which are adequate in the case of B, may not be adequate in the case of A, and it is the duty of the employer to take such additional precautions for the safety of A as may be reasonable. The duty to take reasonable precautions against injury is one which is owed by the employer to every individual workman."

**IMPLICATIONS**

The implications of the judgment are far reaching and only the passage of time may reveal their full extent. At present, they may be summarised as follows:—

Firstly, the employer's duty of care is a duty owed to his employees as individuals, not as groups or classes. It therefore follows that in considering safety measures in any shop or for any

<sup>107</sup> Paris v. Stepney Metropolitan Borough Council (1949) 65 T.L.R. 36.

<sup>108</sup> Paris v. Stepney Metropolitan Borough Council (1951) 67 T.L.R. 34.

class of work, it must be borne in mind that, what is reasonable care in respect of one worker, may not be sufficient in the case of the man working next to him. This maxim does not only apply to disabled workers, but to all employees.

Secondly, in considering the difference in the precautions and the degree of care necessary, two points have to be considered in respect of each individual employee : (a) the risk of injury, and (b) the consequence of any such injury. The obvious implication of these points, is that no machine or system of work can reasonably be regarded as safe unless these two points have been considered in respect of the employee operating that machine, or working under those conditions. Furthermore, a machine or condition which can reasonably be regarded as safe for one employee may not be safe for another with a known disability or known peculiarities which make him more prone to injury, or which would have more injurious consequences in the case of injury.

The decision of the House of Lords has placed a very heavy burden on the shoulders of Production Engineers and Managers, who, in consequence, would be well advised to check up on the work of every one of their employees with known disabilities or known peculiarities, and weigh up for every one separately the degree of care required both in respect of injury and of the consequences which may arise from such injury.

The importance of the Production Engineer's and Manager's activities in the field of Employer's Common Law liability, is perhaps best underlined by looking at some of the damages awarded against Companies, e.g. £9,250 (the revised Paris damages) plus costs. It will, no doubt, be agreed by all that an award of this magnitude may easily ruin a small Company, particularly if it is not fully insured.

#### CONCLUSION

It is rightly said that "A little learning is a dangerous thing," and this is particularly true in the case of Law. Nevertheless, the author feels that ignorance of a subject which is gaining in importance and influence is even more dangerous, particularly when the subject forms part of one's everyday work. It is with this aim in mind that the paper is presented. "Forethought" is always better than "Afterthought," and "Precaution" always better than "Remedy."

Perhaps this paper will help to avoid positions similar to the one in which Oscar Wilde felt compelled to say :—

"I know not whether Laws be right,  
Or whether Laws be wrong ;  
All that we know who lie in gaol

Is that the wall is strong ;  
And that each day is like a year,  
A year whose days are long."

## DISCUSSION

MR. NORMAN STUBBS (Editor of *The Machinist*) said that he appreciated very much the privilege of opening the discussion. It was the custom, of course, first to compliment the author, but on this occasion he was sure that all would agree with him that he could do so most sincerely.

He had been most impressed with the obviously competent way in which Mr. Jost had handled the job right through. A professional legal man could have done no better ; he had presented a paper on a most complex subject, clearly and concisely.

This was a subject which was, of course, of considerable importance to Production Engineers, and Mr. Stubbs felt that all present would welcome an opportunity to study the paper in printed form. He also felt that one needed to consider Mr. Jost's lecture in its true and practical perspective. He had asked a most able and practical executive of an engineering company how many prosecutions they had been involved in during his period with the company, and was assured that they were very few. So there were evidently, as most present knew, practical ways of overcoming these difficulties and keeping out of the hands of the Law. He felt that very much depended on good relations between management and employees, and between management and the Factory Inspectors.

He would like to ask Mr. Jost two questions. What was the position when an employee was injured as a result of a mishap on the part of a fellow employee ? Say, for example, he was struck by a hammer which slipped from the hand of a mate. Who was responsible in Law ?

Again, he had the greatest admiration for those men one could see hanging more or less by their teeth from the top of Nelson's Column, and other structures. Only recently many people had stood almost transfixed as they watched men perilously perched on the slender lattice work of the Skylon, 200 ft. or more up, yet unperturbed. He believed they received danger money, but had often wondered what the employers' liabilities were in regard to the safety of these men.

MR. JOST replied that the most comprehensive knowledge of Industrial Law was no substitute for good relations between management and employees, and between management and the Factory Inspector. On the other hand, it was a valuable and powerful tool in the hands of Managers and Production Engineers in their efforts to further the well-being of their Companies.

### COMMON EMPLOYMENT—VOLUNTARY RISKS

Mr. Stubbs' two questions had raised two very important problems. The first question involved the doctrine of Common Employment, which was abolished in 1948 by the Law Reform (Industrial Injuries) Act, but was still applicable to accidents which had happened before July 1948. The doctrine of Common Employment held that, in addition to the duty owed by the employer to the employee, the latter was also owed a duty by his fellow workmen, and if a fellow worker in failing in that duty did something, not being part of the system of work, and an injury resulted therefrom, the employer could plead "Common Employment" as a defence, and, if proved, would be not liable. An action could, of course, be brought against the fellow workman.

Since the abolition of the doctrine of Common Employment, this defence could no longer be pleaded. This, no doubt, involved an extension of the employer's vicarious liability in respect of his duty to create a safe system of work, and it remained to be seen where the Courts would draw the line as to the limits of this responsibility.

Mr. Stubbs' second question involved the dictum of *volenti non fit injuria*. Where a worker had undertaken a dangerous job with full knowledge and consent of the full dangers of the work, the employer was usually absolved if an accident happened. It was important to note, firstly, that the worker had not only to know of the dangers involved, but had also to CONSENT to work in these circumstances; and, secondly, that the application of this doctrine was very limited indeed, and could, of course, not be applied as a means to circumvent Statutory duties.

In the case of the man working on the Skylon, the doctrine might be applied if the man, who had freely undertaken to do the work, had roped himself insufficiently or insecurely and an accident occurred as a result, but it would not apply if the rope supplied by the employer was of faulty material, or if the man was hit by the arm of a crane, or if part of the structure to which the rope had been fastened, gave way.

### INDUSTRIAL RELATIONS

MR. R. KIRCHNER after thanking Mr. Jost for his lecture, pointed out that the Law was only one small facet of Production Engineering, and much could be achieved by promoting good industrial relations within the factory.

Mr. Jost replied that he fully agreed with Mr. Kirchner and he hoped that he had not given an impression to the contrary. Nevertheless, he felt that a good knowledge of Industrial Law increased the Production Engineer's or Manager's value to his employers, and might also be beneficial when promotions were considered.

## PAYMENT DURING ILLNESS

MR. W. F. S. WOODFORD (Institution Secretary) congratulated Mr. Jost on his paper, and asked if the employer was liable to pay the wages of a weekly employed employee during a period of illness, particularly if the latter was contracted outside the factory, e.g. T.B.

MR. JOST replied that the answer in such a case depended mainly on whether the employee was paid for the work, or whether he was paid for the time he put in, and whether payment during temporary illness was an implied condition of the contract.

In *Marrison versus Bell* it was held that in the case of a shop assistant, paid on a weekly basis, wages were due, but in *O'Grady versus Saper Ltd.*, a case which was brought up by the plaintiff, a commissionaire also employed on a weekly basis, after reading a report on the above case, it was held that "the terms of the contract between the two parties were that the employee should be paid, not during the period that he was ready to work, but only for such period as he did work." It was said that if somebody had raised the question when the parties were originally making the bargain, they both would have agreed that wages were not due. It was pointed out in this case that the question whether wages were payable was purely a question of fact in every case. It should also be mentioned that the plaintiff had been temporarily disabled before, and had accepted the stoppage of wages.

If the contract of employment, which Mr. Woodford referred to was one in which weekly notice could be given, he would suggest that, to avoid legal complications, a week's notice be given. There was, of course, nothing to stop the employer from re-employing the employee on his recovery.

## CONTRIBUTORY NEGLIGENCE

MR. M. SERGEAUNT asked what the legal position was when an employee was injured and subsequently died, the accident being partly or wholly due to his own negligence during his work in the factory.

MR. JOST replied that this point too touched an important doctrine, that of contributory negligence. Before the Law Reform (Contributory Negligence) Act 1945, which came into force on June 15th, 1945, a workman, or in the case of his death, his dependents, had no claim if contributory negligence could be proved. Since the Act of 1945, however, a workman's claim to damages was no longer defeated by his own contributory negligence. Now the Courts would have regard to all the causes that led to the accident, and apportion the damage accordingly.

## RENTING OF MACHINES : WORKS VISITS

MR. G. R. BURN asked what the position was in the case of machines being rented by the employer, e.g. certain types of riveting machines ; also whether compensation was payable to persons who were injured whilst on a visit to another factory, e.g. I.Prod.E. visits.

MR. JOST replied that as far as Section 17 of the Factories Act 1937 was concerned, e.g. the encasing or guarding of set screws, bolts or keys on revolving parts, or the guarding of gears, it was the owner or the hirer, or the maker of the machine that was responsible if the machine was made after 1937, but as far as the guarding of the machine was concerned, and the precautions necessary to make it safe to work on, or with, this was a duty imposed on the occupier of the factory, usually the employer, where the machine was installed.

With reference to compensation for accidents suffered during works visits, the position of the visitors was that of licensees. As far as the occupier's Statutory duties were concerned, they extended also to visitors, e.g. if a visitor fell through an opening in the floor which was unfenced, or if an accident arose through the floor or steps, or passage having been of unsafe construction, or not been properly maintained, the occupier would usually be liable. Otherwise, his duties were only to protect licensees from hidden dangers.

## COMPENSATION FOR INJURIES

MR. R. T. MUSTARD pointed out that contracts could be signed before the visits mentioned in the previous question, to cover the question of liability for accidents. He also asked, in connection with the employer's liability to pay compensation, to whom this compensation was payable if the injured party died.

MR. JOST replied that whilst in general he agreed with the first part of Mr. Mustard's remarks, he wished to re-emphasise that the employer's right to contract-out of his liabilities was limited.

With reference to the question on compensation, he assumed that Mr. Mustard referred to compensation payable under the Workmen's Compensation Acts, which in 1948 had been superseded by The National Insurance (Industrial Injuries) Act 1946. This Act, amongst other things, shifted the liability for paying compensation for accidents from the employers on to the State, which now was responsible for the payment of benefits in respect of all industrial accidents arising out of, and in the course of, the employment.

In the case of death certain benefits were due to his legal dependents.

## REASONABLE NOTICE: RIGHT OF ACTION

MR. J. ZELENKA asked for more details of the case of the dismissed Sales Manager mentioned during the lecture, particularly in respect of his period of notice. He also asked whether any compensation was payable in the case of the dough-mixer accident.

MR. JOST replied that the Sales Manager had a contract for a period of two years. On completion of this time, i.e. on performance of the contract, no new contract was made, but the Sales Manager stayed on. The Judge held that he was, therefore, entitled to reasonable notice, and decided that six months were reasonable notice in his case.

With reference to the dough-mixer accident, MR. JOST wished to distinguish between damages payable by the employer at Common Law, and National Insurance benefits. In the case of the dough-mixer, the Inner House confirmed that there had been no Statutory obligation by the employers to fence and that, therefore, no damages were due from them based on that ground. There were, however, other grounds on which this case was based; furthermore the workman's Common Law Action did not prevent him from claiming benefits under the National Insurance (Industrial Injuries) Act 1946. As was generally known, this was a contributory insurance scheme, to which every employer and employee had to pay a certain sum every week.

It was interesting to note that one of the things that distinguished the new Act from the Workmen's Compensation Acts, was that whereas before the present Act came into force, if the employee claimed under the Employer's Liability Acts, or at Common Law, he was debarred from claiming under the Workmen's Compensation Acts, and *vice versa*. Since the passing of the present Act this disqualification no longer existed. If, therefore, the worker involved in the dough-mixing accident could show that that accident had arisen out of, and in the course of his employment, he was entitled to benefit under the National Insurance scheme, in spite of his having commenced an Action at Common Law. It should be pointed out that an appeal to the House of Lords was pending and the matter was, therefore, *sub judice*.

## EMPLOYEE AS TENANT

MR. CLARKE asked what the position of the Production Engineer was who accepted a job and at the same time a house for rent. Would he have to leave the house if he ceased being employed by his landlord?



MR. JOST replied that this was a very important question, particularly in these days. If a Production Engineer was also the tenant of his employer, he became a Statutory tenant, and as such enjoyed the protection of the Rents Acts, provided that his rent was more than two thirds of the rateable value of the property, or that the house or flat, or rooms were not an integral part of the job itself, e.g. chauffeur's flat above the garage, or gate-keeper's lodge, etc. Subject to such exceptions, the Production Engineer enjoyed the protection of the Rents Acts as a Statutory tenant.

The employer, however, could apply for possession provided he could PROVE (1) that the tenant was in his employ when the tenancy began, (2) that the premises were let because of the employment, (3) that the tenant was no longer in his employ. If he could prove these three points, and if he could also show that the dwelling house was reasonably required by him as a residence for one of his full-time employees, or for someone who would be entering his employ if accommodation could be found, then on application to the Courts he might get possession. He had, however, no right to ask an employee to quit the dwelling house as soon as his contract of employment had come to an end.

#### PATENTS

MR. JERRARD asked what the position was as regards patents invented by the Production Engineer, both in the course of his duties and outside working hours.

MR. JOST replied that the patent was granted to the TRUE and FIRST inventor of an invention. There was, however, a difference between (1) the question of who was the true and first inventor, and (2) the question of who was entitled to the benefit. In answer to the first question, he would say that if the Production Engineer was merely carrying out instructions of his employer, he could not be either the inventor or a joint inventor, even if great ingenuity and skill had been used; if the Production Engineer contributed imagination and did not merely carry out orders, he might become a joint inventor; but if the idea as well as realisation were solely his own, then he would be the true and first inventor.

With regard to the second question, in the absence of an agreement to the contrary, the employer was usually entitled to the benefits of the invention if the latter arose out of the Production Engineer's work, or from information or opportunities afforded him by his employment, or if the invention arose out of experimental work for his employer, whether performed in the course of his work or not. If, of course, the invention was entirely unconnected with his work or his employer's business, or products, he would be entitled to the benefits therefrom.

MR. RUTTER then proposed the vote of thanks, which was carried with acclamation.



## A PRODUCTION ENGINEER'S GUIDE TO FACTORY LEGISLATION

by H. PETER JOST, A.M.I.Mech.E., Mem.A.S.M.E., A.M.I.Prod.E.

*NOTE : This supplement does not attempt to give a complete summary or an authoritative interpretation of the Acts and Orders mentioned therein, nor does it give decisions upon questions which may involve judicial proceedings. (Revised October, 1951.)*

**T**HE Factories Acts are administered (certain provisions in respect of sanitary conveniences, and health and sanitary regulations in factories not employing mechanical power, and relating to means of escape from fire excepted) by the Factory Inspectors.

For the purpose of executing the Factories Acts, a Factory Inspector is given very wide powers, including the following :—<sup>1</sup>

- (1) The right of entry, inspection and examination at all reasonable times, by day and night, of any factory and every part thereof, when there is reasonable cause to believe that any person is employed therein.
- (2) The right to take a constable if serious obstruction in the course of the Factory Inspector's duty is reasonably apprehended.
- (3) The right to require production of the registers, certificates, notices and documents kept in pursuance of the Act, and to inspect, examine and copy any of these.
- (4) The right to make such examination and enquiry as may be necessary to ascertain whether the provisions of the Factories Acts and the enactments relating to public health are complied with.
- (5) The right to require any person whom he finds in a factory to give such information as it is in his power to give, as to who is the occupier of the factory.
- (6) The right to examine, either alone or in the presence of any other person, as he thinks fit, with respect to matters under the Factories Acts, every person whom he finds in a factory, or whom he has reasonable cause to believe to be or to have been employed in a factory within the preceding two months.

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<sup>1</sup> Factories Act, 1937. Section 123.

- (7) In the case of an Inspector who is a duly qualified Medical Practitioner, the right to carry out such medical examinations as may be necessary for carrying the Acts into effect.
- (8) The right to exercise such other powers as may be necessary for carrying the Factories Acts into effect.

Whilst the Factory Inspector himself must keep within the law, e.g., he is not allowed to break into a factory, any person obstructing him is liable to a fine, not exceeding £5.

However, far from being obstructive, the wise and prudent Manager and Production Engineer will do everything to assist and oblige the Factory Inspector on his visit to the factory. This may at times be difficult, particularly in the case of fencing certain machine tools and milling cutters. However, the law says that if a machine cannot be securely fenced while remaining commercially practicable or mechanically useful, the Factories Acts prohibit its use.<sup>2</sup> One of the Factories Acts' regulations provides also that on the Factory Inspector's application to a Court, the latter may close down a factory, a department, a machine, or prohibit the use of a process, etc.<sup>3</sup>

Any statements to the Factory Inspector must be made in good faith. There are heavy penalties to any persons for forging of certificates, the making of false entries and false declarations, viz. fines up to £100 or imprisonment for three months.<sup>4</sup>

A point of great importance to the Production Engineer is that where an act or default for which an employer is liable is either : proved to have been committed with the consent or connivance of, or to have been facilitated by any neglect on the part of any Director, Manager, Secretary, or other officer, (e.g. a Production Engineer)<sup>5</sup>, or is in fact the act or default of some Agent, Servant, Worker or other person (e.g. a Production Engineer)<sup>6</sup> that person shall be guilty of the offence and liable to the like fine as if he were the employer.

If the employer can prove that he has used all due diligence to enforce the execution of the Acts, and that the other person had committed the offence in question, without his consent, connivance or wilful default, and in contravention of his orders, that person can be proceeded against and if found guilty will be subject to the same penalties as would be the employer.<sup>7</sup>

Example : if a motion study or development engineer, in contravention of orders given to him and without his employer's

<sup>2</sup> Davies v. Thomas Owen & Co., (1919) 2 K.B. 39.

<sup>3</sup> Factories Act, 1937. Section 40.

<sup>4</sup> *ibid.* Section 135.

<sup>5</sup> *ibid.* Section 130.

<sup>6</sup> *ibid.* Section 136.

<sup>7</sup> *ibid.* Section 137.

knowledge, removes a certain safety appliance, or allows work without the guard required under the Factories Acts, even though at the time he does not recognise it as such, he may be the subject of an action against himself. The same applies to the materials handling engineer using a lifting appliance, or allowing its use for a heavier load than permissible.

Three other duties<sup>8</sup> which Factory Legislation places on the shoulders of everyone in the factory (including the Production Engineer), are :—

- (a) The duty not to interfere with or misuse any means, appliance, conveyance or other thing provided in pursuance of Factory Legislation or Statutory Orders.
- (b) The duty to USE any means or appliance provided for securing health and safety.
- (c) The duty not to do *anything* likely to endanger oneself or others.

Fines of up to £20 for each contravention, and £5 for each day it continues, may be imposed.<sup>9</sup>

**DEFINITION  
OF A  
FACTORY**

A FACTORY<sup>10</sup>, within the meaning of the Factories Acts, means any premises in which (or within the close or curtilage or precincts of which) persons are employed in manual labour in any processes for, or incidental to, any of the following :—

- (a) the making of any article or of part of any article ; *or*
  - (b) the altering, repairing, ornamenting, finishing, or washing, or the breaking up or demolition of any article ; *or*
  - (c) the adapting for sale of any article,
- the work being carried on BY WAY OF TRADE or FOR PURPOSES OF GAIN, and where the employer has the right of access and control.

Also included are a number of trade premises including Shipyards and Docks, Sorting Shops, Repair Shops with mechanical power, any factory siding or line, etc.

With the approval of the Chief Inspector, a part of a factory may be taken to be a separate factory, or several factories may be taken as one factory. For the purpose of hours of employment of women and young persons, different branches or departments of work carried on in the same factory may be deemed to be different factories.<sup>11</sup>

<sup>8</sup> Factories Act, 1937. Section 119.

<sup>9</sup> *ibid.* Section 131.

<sup>10</sup> *ibid.* Section 151.

<sup>11</sup> S.R. & O., 1939. No. 1888.

A place within the curtilage or precincts forming a factory, but which is used solely for another purpose, may be treated as a separate factory.

Parts of a factory may be in the open air. Administrative and Clerical Offices, Pure Research Laboratories, Drawing and Designing Rooms, Caretaker's Residence, Showrooms and Sales-rooms are not part of a factory even if they are within the factory ; neither are Factory Sports Grounds.

Works Canteens and Surgeries, Lavatories, Rest Rooms, Court-yards and Staircases are part of the factory.

**GENERAL  
HEALTH  
PROVISIONS**

*Cleanliness.*<sup>12</sup> Every factory must be kept in a clean state and free from effluvia (smells) arising from any drain, sanitary convenience or nuisance ; accumulations of dirt and refuse must be removed daily from floors, benches, staircases and workrooms.

Floors of every workroom must be cleaned once a week by washing—or if effective or suitable—by sweeping or other methods.

All inside walls, partitions, ceilings or tops of rooms, passages, and staircases must either :

if they have smooth impervious surfaces (e.g. plastic, glass, lino etc.), be washed with soap or detergent, or cleaned by other approved methods, at least once every fourteen months,  
*or*,  
if they are painted or varnished, be repainted or revarnished at least once every seven years, and cleaned, as above, at least once every fourteen months, *or*,  
otherwise be whitewashed or colourwashed at least once every fourteen months.

*Overcrowding.*<sup>13</sup> A factory must not be so overcrowded as to cause risk of injury to the health of the persons employed therein; 400 cu. ft. should be allowed per person, space over 14 ft. high not being taken into consideration. There are special provisions in the case of factories dealing with explosive materials.

A notice specifying the maximum number of employees permissible must be posted in each workroom.

*Temperature.*<sup>14</sup> A reasonable temperature must be maintained in each workroom, but no means of heating must be used whose fumes are likely to be injurious or offensive to the employees. In workrooms where the work performed is mainly of a sedentary nature, not involving serious physical effort, the temperature (after the first hour) must be over 60° F. At least one thermometer must be provided in each workroom.

<sup>12</sup> Factories Act, 1937. Section 1.

<sup>13</sup> *ibid.* Section 2.

<sup>14</sup> *ibid.* Section 3.

*Ventilation.*<sup>15</sup> Adequate ventilation must be maintained in each room.

All fumes, dust and other impurities generated in the course of any processes or work, which may be injurious to health, must so far as practicable be rendered harmless by ventilation.

*Lighting.*<sup>16</sup> Every part of a factory, whether worked in or used as passage, must be sufficiently and suitably lit, whether by natural or artificial light.

In factories where persons are regularly employed in a process for more than 48 working hours a week or in shifts, the minimum standard of illumination generally required is 6 ft. candles, measured 3 ft. above the floor. In the case of the height of light sources exceeding 25 ft., or where uniform lighting is not possible due to structure, position of machinery etc., general illumination 3 ft. above the floor must be not less than 2 ft. candles, but must be 6 ft. candles or near, where the work is actually carried out. In the case of artificial light less than 16 ft. high and having a brightness of 10 candles per square inch, no part of the source of light must be visible to persons employed within 100 ft. except at an angle exceeding 20°. <sup>17</sup>

All glazed windows and skylights used for the lighting of work-rooms must, so far as practicable, be kept clean on both the inner and outer surfaces, and free from obstruction, but windows and skylights can be whitewashed or shaded to mitigate heat or glare.

*Drainage of Floors.*<sup>18</sup> Effective means of drainage must be provided for wet processes.

*Sanitary Conveniences.*<sup>19</sup> Sufficient and suitable sanitary conveniences, separate for male and female employees, must be provided, maintained, kept clean and sufficiently lit.

One convenience is required for every 25 females. In the case of factories employing up to 100 males, one convenience is required for every 25 males. If the number of males exceeds 100 and sufficient urinal accommodation is provided, four conveniences must be provided for the first 100 males and one further for each additional 40. If more than 500 males are employed, one convenience per 60 men is sufficient provided (1) sufficient urinal accommodation is available and (2) the Medical Officer of Health has issued a certificate to this effect. <sup>20</sup>

Every convenience must be sufficiently ventilated and must not communicate with any workroom except through the open air or through an intervening ventilated space.

<sup>15</sup> Factories Act, 1937. Section 4.

<sup>16</sup> *ibid.* Section 5.

<sup>17</sup> S.R. & O., 1941. No. 94.

<sup>18</sup> Factories Act, 1937. Section 6.

<sup>19</sup> *ibid.* Section 7.

<sup>20</sup> S.R. & O., 1938. No. 611.

Privacy, proper doors and fastenings and convenient accessibility are also required as well as separation of conveniences for different sexes.

**GENERAL  
SAFETY  
PROVISIONS**

*Prime Movers.*<sup>21</sup> Every flywheel directly connected to any prime mover and any moving part of any prime mover (certain electric prime movers excepted), shall be securely fenced whether situated in an engine house or not.

Every part of electric generators, motors or rotary convertors (not included in the previous provisions) must be securely fenced, unless they are in such a position or of such construction as to be safe to every person employed or working on the premises.

*Transmission Machinery.*<sup>22</sup> Every part of the transmission machinery must be securely fenced unless it is in such a position or of such construction as to be safe to every person employed or working on the premises.

(This applies not only to overhead shafting, but also to individual transmission units, test bench shafts etc.)

Efficient means must be provided in every room to cut off all the power from the transmission machinery in that room.

No driven belt is allowed to ride on a revolving transmission shaft when not in use.

Striking gear or other mechanical belt shifting appliances must be provided, and must be constructed in such manner as to prevent the driving belt from creeping back from the loose on to the fast pulley, (e.g. by means of spring safety catches).

*Other Machinery.*<sup>23</sup> Every dangerous part of any other machinery must be securely fenced unless it is in such a position or of such construction as to be safe to every person employed or working on the premises. If the nature of the operation prevents securing by fixed guard, a device automatically preventing the operator from coming into touch with a dangerous part must be provided, (e.g. certain types of press guards).

"The test whether parts of machinery are dangerous is whether they may reasonably be foreseen to be a source of injury to people who may be in the vicinity, taking them with all the *ordinary infirmities to which human nature is prone*. The occupier must realise that not everyone is careful, many are *hasty, careless or inadvertent*; some are *unreasonable* or even *disobedient*. It may be unlikely that they will act in such a way, but it is not only the likely, but also the unlikely accident that the occupier must guard against. He must guard against all conduct which he might reasonably foresee. The limit of his responsibility is only reached when the machinery is safe for all except the incalculable individual, against whom no

<sup>21</sup> Factories Act, 1937. Section 12.

<sup>22</sup> *ibid.* Section 13.

<sup>23</sup> *ibid.* Section 14.

reasonable foresight can provide, the individual who does not merely do what is unlikely, but also what is unforeseeable, or, at least, not to be foreseen by any ordinary man."<sup>24</sup>

The compulsory use of various safety appliances may be prescribed from time to time by the Minister of Labour and National Service. Stock bars in lathes, capstans, autos, etc., must be securely fenced.

*Unfenced Machinery.*<sup>25</sup> EXAMINATION of any machine part in motion and not securely fenced or temporarily exposed, and any ADJUSTMENT or LUBRICATION which must be done *immediately*, or *necessarily* whilst the part is in motion, e.g. in the case of a continuous process, is permitted only if the following conditions are fulfilled :—<sup>26</sup>

- (a) One man (or more) over the age of eighteen must be specially appointed for this task, and his name must be entered in the General Register.
- (b) He must be properly trained for the operation and must be acquainted with the dangers involved.
- (c) He must know the regulations dealing with unfenced machinery, and must be supplied with a precautionary leaflet.
- (d) He must wear a closely fitting one-piece overall having no exposed loose ends and no external pockets other than a hip pocket.
- (e) Another person who has been instructed what to do in an emergency must be within sight or hearing.
- (f) Other persons must be safeguarded, (e.g. by barriers).
- (g) All moving parts of nearby machinery must be securely fenced.
- (h) Any ladder must be securely fixed or lashed or held by a second person.

In the case of a special occasion, any competent man over eighteen may do this job, if previously authorised in writing in the proper form by the Manager, or another responsible person.

There are special regulations for transmission machinery used in a number of processes<sup>27</sup> (see Appendix 1).

*Construction and Sale of New Machinery.*<sup>28</sup> Every set-screw, bolt or key on any revolving part must be sunk-in, encased or guarded, as well as every gear, including worms and friction gears. These provisions apply to machines built or rebuilt after July 1937.

<sup>24</sup> *Walker v. Bletchley Flettons Ltd.* (1937) All E.R. 170 as in *Smithwick v. National Coal Board* (1950) 66 Times L.R., P.2. No. 4

<sup>25</sup> Factories Act, 1937. Section 15.

<sup>26</sup> S.R. & O., 1938. No. 641.

<sup>27</sup> S.R. & O., 1946. No. 156.

<sup>28</sup> Factories Act, 1937. Section 17.



Any person selling or hiring a machine not complying with the above provisions can be fined up to £100.

*Vessels containing Dangerous Liquids.*<sup>29</sup> If a vessel containing dangerous liquids has an edge less than 3 ft. from the ground, it must be securely fenced or covered, and steps must be taken to prevent any person from falling into it, its structure, sump or pit.

*Self Acting Machines.*<sup>30</sup> No traversing part of any self-acting machine, or any material on it, may run within a distance of less than 18 inches from any structure, if any person is liable to pass through this space, whether in the course of his employment or not.

(This provision applies not only to grinding machines, milling machines, shaping and planing machines, but also to certain types of materials handling and fixed mechanical handling equipment).

*Cleaning of Machinery by Women and Young Persons.*<sup>31</sup> No woman or young person must clean any machine in motion, or if there is a risk of injury from another machine in motion.

*Training and Supervision of Young Persons Working at Dangerous Machines.*<sup>32</sup> No young persons must work on any of the following machines unless (a) he has been fully instructed as to the dangers and the precautions to be observed, (b) he has received sufficient training in work at the machine and (c) he is under adequate supervision by a person who has a thorough knowledge and experience of that machine.

List of machines : power presses other than hydraulic presses, milling machines, guillotines, mechanical brick and tile presses, dough mixers and dough brakes, mechanical meat mincing machines, hydro extractors (laundries), platen printing machines, carding machines (upholstery works).<sup>33</sup>

*Hoists and Lifts.*<sup>34</sup> Hoists and lifts must be of good mechanical construction, sound material, adequate strength, and must be properly maintained.

Subject to certain exemptions,<sup>35</sup> all hoists and lifts must be thoroughly examined at least once every six months by a competent person, the report to be entered in or attached to the General Register.

The maximum load must be conspicuously marked and no greater load must be carried.

Every hoistway or liftway must be protected and fitted with gates. Lifts and liftways must be constructed so as to prevent any person or goods being trapped.

<sup>29</sup> Factories Act, 1937. Section 18.

<sup>30</sup> *ibid.* Section 19.

<sup>31</sup> *ibid.* Section 20.

<sup>32</sup> *ibid.* Section 21.

<sup>33</sup> S.R. & O., 1938. No. 485.

<sup>34</sup> Factories Act, 1937. Section 22.

<sup>35</sup> S.R. & O., 1938, No. 489; and 1946, No. 1947; and 1941, No. 1702.



All lifts and hoists built or rebuilt after July 1937 must have gates which do not open except when the cage is at a landing, or must have cages that cannot be moved unless gates are closed. In the case of hoists and lifts not connected with mechanical power, the provisions of this paragraph do not apply, but gates must be kept closed except when the cage or platform is at rest at a landing.<sup>36</sup> These regulations apply to existing Goods Lifts only and there are special provisions for new lifts and lifts used for carrying persons.

*Chains, Ropes and Lifting Tackle.*<sup>37</sup> Chains, ropes and lifting tackle including chain slings, rope slings, rings, hooks, shackles and swivels, must be of good construction, sound material, adequate strength and free from patent defects.

A table showing safe working loads of every kind and size of chain, rope or lifting tackle in use, and in the case of multiple slings, a safe working load at different angles of the legs, must be posted in the stores where this equipment is kept, and in prominent positions on the premises. No chain, rope or lifting tackle not shown in this table must be used unless the safe working load (at different angles in the case of multiple slings) is plainly marked on it.

No chain, rope or lifting tackle must be used for loads exceeding the safe working loads.

Subject to certain exemptions,<sup>38</sup> all chains, ropes and lifting tackle must be inspected by a competent person at least once every six months, and none of this equipment, except fibre ropes and slings, may be taken into a factory unless there is a proper test and examination certificate with it, specifying *inter alia* the safe working load.

Subject to exemptions in respect of certain types,<sup>39</sup> all chains and lifting tackle must be annealed at least once every fourteen months, or in the case of chains or slings of  $\frac{1}{2}$  inch bar or smaller, or chains used in connection with molten metal or molten slag, once every six months.

Chains and lifting tackle not in regular use need be annealed only when necessary.

A register must be kept containing the prescribed information in respect of each chain etc., *inter alia* identification mark, date when taken into use, date of each examination and report date and number of certificate of new chains etc., and dates of annealing.<sup>40</sup>

*Cranes and Other Lifting Machines.*<sup>41</sup> Cranes and other lifting machines including crabs, winches, teazles, pulley blocks, gin wheels, transporters and runways, whether fixed or movable must be of

<sup>36</sup> Factories Act, 1948. Section 11.

<sup>37</sup> Factories Act, 1937. Section 23.

<sup>38</sup> S.R. & O., 1941. No. 1702.

<sup>39</sup> Cert. of Exemption No. 1. (1938) General.

<sup>40</sup> S.R. & O. 1938. No. 599.

<sup>41</sup> Factories Act, 1937. Section 24.

good construction, sound material, adequate strength and free from patent defects, and must be properly maintained and examined at least once every fourteen months.<sup>42</sup>

Prescribed details must be kept in a register containing similar information as in the case of chains.<sup>43</sup>

Safe working loads must be properly marked and these must not be exceeded.

New cranes etc., must have a test certificate.

Overhead cranes must not approach persons within 20 ft. of the place where they work.

*NOTE:* In view of the special requirements of inspection etc., relating to lifts, hoists, chains, cranes, etc., Managers often prefer to enter into an Inspection/Insurance contract.

*Floors, Passages and Stairs.*<sup>44</sup> All floors, steps, stairs, passages and gangways must be of sound construction and properly maintained.

Every staircase must have a substantial handrail which—if the staircase has an open side—must be on that side. Two handrails are required for open and dangerous staircases; open sides must also have a lower rail.

Openings in floors must be fenced. Ladders must be soundly constructed and properly maintained.

*Safe Means of Access and Safe Place of Employment.*<sup>45</sup> These must be provided and maintained in respect of every place at which any person has at any time to work.

Where a person works at a place where he has not secure foothold and—if necessary—handhold, and he is liable to fall more than 10 ft., fences must be provided, or his safety must be assured otherwise.

*Places where Dangerous Fumes, and Explosive or Inflammable Dust, Gas, etc., are present.*<sup>46 48</sup> Where work has to be done inside any chamber, tank, vat, pit, pipe, flue or similar confined space in which dangerous fumes are likely to be present, a number of conditions have to be adhered to, including provision of manholes, breathing apparatus, trained persons and other arrangements.<sup>47</sup>

Special provisions including those of exclusion of possible sources of ignition, explosive-proof plant, restrictions of effects of explosions are also applicable in the case of explosive or inflammable dust or gas.<sup>49</sup>

<sup>42</sup> see also S.R. & O., 1941. No. 1702.

<sup>43</sup> S.R. & O., 1938. No. 600.

<sup>44</sup> Factories Act, 1937. Section 25.

<sup>45</sup> *ibid.* Section 26.

<sup>46</sup> Factories Act, 1937, Section 27; and Factories Act, 1948, Section 11.

<sup>47</sup> S.I., 1949. No. 189.

<sup>48</sup> Factories Act, 1937. Section 28.

<sup>49</sup> *ibid.*

*Steam Boilers.*<sup>50</sup> Steam boilers must be equipped with safety valves, stop valves, pressure gauges, water gauges and clear distinguishing marks. Means for attaching test pressure gauge and fusible plug or low-water alarm device must also be provided. Subject to certain exemptions,<sup>51</sup> every steam boiler and all its fittings must be examined by a competent person at least once every 14 months, and after extensive repairs; his report must be attached to the General Register.

The maximum boiler pressure must be marked in colour on the pressure gauge and be clearly visible.

*Steam Receivers and Containers.*<sup>52</sup> Steam receivers are subject to similar requirements, except that the maximum period between inspection is 26 months.<sup>53</sup>

*Air Receivers.*<sup>54</sup> Every air receiver must have the safe working pressure visibly painted on it. If connected to a compressor, it must be either designed to withstand its maximum pressure, or have a suitable reducing valve or a similar appliance.

Air receivers must have safety valves, pressure gauges, draining appliances, man or handholes for cleaning purposes, and identification markings.

Subject to certain exemptions,<sup>55</sup> every air receiver must be thoroughly cleaned and examined in every period of 26 months by a competent person, and prescribed particulars must be attached to the General Register.

*Gas Holders.*<sup>56</sup> Gas holders having a storage capacity of 5,000 cu. ft. and over must be examined every two years.

*NOTE:* In view of the special requirements in respect of examination of steam, air and gas equipment, Companies usually prefer to enter into Insurance/Inspection contracts.

*Means of Escape in Case of Fire.*<sup>57</sup> A Certificate from the District Council (in London from the L.C.C.) as to satisfactory means of escape must be obtained in respect of factories built before July 1937, employing over 20 persons, or employing more than 10 persons in the same building on any floor above the ground floor,

<sup>50</sup> Factories Act, 1937. Section 29.

<sup>51</sup> Cert. of Exemption (General) No. 6 (1939), No. 9 (1940), No. 10 (1939), No. 15 (1939), No. 16 (1940), No. 18 (1942), No. 21 (1941), No. 24 (1948); S.R. & O., 1941, No. 1702.

<sup>52</sup> Factories Act, 1937. Section 30.

<sup>53</sup> Cert. of Exemption (General) No. 7 (1939), No. 12 (1939), No. 13 (1939), No. 17 (1940), No. 19 (1940), No. 20 (1940), No. 24 (1948), No. 25 (1950); and S.R. & O., 1941, No. 1702.

<sup>54</sup> Factories Act, 1937. Section 31.

<sup>55</sup> Cert. of Exemption (General) No. 22 (1942), No. 23 (1947); S.R. & O., 1941, No. 1702.

<sup>56</sup> Factories Act, 1937, Section 33; and Factories Act, 1948, Section 11. see also S.R. & O., 1938. No. 598.

<sup>57</sup> Factories Act, 1937. Section 34.

or more than 20 ft. above ground level ; and in respect of factories built after that date, in which more than 10 persons are employed in the same building on any floor above the ground floor, also in respect of factories in or under which explosive or highly inflammable materials are stored or used.

If, after issue of the Certificate, the factory occupier wishes to make material alterations in structure, premises, extensions, number of persons employed, etc., etc., he must give notice in writing to the Council of the proposal, and the Council may in turn require the occupier to make alterations to existing means of fire escape.

*Safety Provisions in the Case of Fire.*<sup>58</sup> Doors must not be locked or fastened so that they cannot be easily and immediately opened from the outside. Any doors opening on to any staircase from any room in which more than 10 persons are employed, and all other doors serving as an exit must—except in the case of sliding doors—be constructed to open outwards. The same applies to doors at the foot of staircases, unless continuously open.

Every hoistway or liftway made after July 1937 must be completely enclosed with fire resisting materials, inclusive of doors giving access to it. The top must be provided with a vent or some material easily destroyed by fire.

Every fire window, door or fire exit must be marked by a notice in red letters.

Effective means of fire warning must be provided in factories employing more than 20 persons and must be audible by all.

The contents of any room must permit free passage for all persons as a means of escape in the case of fire.

*Fire Drill.*<sup>59</sup> Effective steps must be taken in factories employing more than 20 persons in the same building above the first floor, or more than 20 ft. above ground level, or where there are explosive materials, to ensure that all employees are familiar with the means of escape and the routine to be followed in case of fire.

#### GENERAL WELFARE PROVISIONS

*Drinking Water.*<sup>60</sup> Conveniently accessible and sufficient supply of wholesome drinking water must be provided, either in an upward jet, or with cups that can be rinsed in drinking water. Water which does not come from a public main must be approved by the District Council.

Stationary drinking water must be renewed at least daily.

*Washing Facilities.*<sup>61</sup> Conveniently accessible, adequate and suitable facilities for washing, inclusive of soap and towels or other suitable means of cleaning and drying, must be provided.

<sup>58</sup> Factories Act, 1937. Section 36.

<sup>59</sup> *ibid.* Section 37.

<sup>60</sup> *ibid.* Section 41.

<sup>61</sup> *ibid.* Section 42.

*Accommodation for Clothing.*<sup>62</sup> Adequate and suitable accommodation for clothing not worn during working hours, and for the drying of such clothing, must be provided.

*Facilities for Sitting.*<sup>63</sup> All employees must be provided with suitable sitting facilities if their work can be performed seated; otherwise seats must be provided so as to take advantage of occasional opportunities for sitting.

Footrests either on chair, bench, or machine etc., must be provided for work which is mainly sedentary.

*First Aid.*<sup>64</sup> First Aid boxes or cupboards (marked "First Aid" if new) must be maintained, at least one per 150 employees working at one time. (For contents of boxes see Appendix 2.)<sup>65</sup> Nothing except first aid requisites must be kept in them.

Each box must be in charge of a responsible person. In the case of a factory where more than 50 persons are working at one time, this must be a person trained in first aid treatment, who must always be readily available during working hours. A notice must be affixed in every workroom stating the name of the person in charge of the first aid box in that room.

Factories providing ambulance rooms may be exempted from these provisions by the Chief Inspector of Factories.

*Medical and Welfare Services.*<sup>66</sup> In the case of factories on munition work, including sub-contracts, or on work for the Crown, the Factory Inspector may specify the provision of any of the following :—

- (a) Medical supervision of persons employed in the factory on such manufacture.
- (b) Nursing and first aid services for such persons.
- (c) Supervision of welfare of such persons.

*Canteens.*<sup>67</sup> A factory employing more than 250 workers, engaged on essential work, may be requested by the Chief Inspector to provide a canteen where workers can buy and eat hot meals.

*Welfare Regulations.*<sup>68</sup> A list of special welfare orders made by the Minister under Section 46 of the Factories Act is given in Appendix 3.

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<sup>62</sup> Factories Act, 1937. Section 43.

<sup>63</sup> Factories Act, 1948. Section 6.

<sup>64</sup> Factories Act, 1937. Section 45.

<sup>65</sup> S.R. & O., 1938, No. 486. 1937, No. 769.

<sup>66</sup> S.R. & O., 1940. No. 1325.

<sup>67</sup> S.R. & O., 1943. No. 573.

<sup>68</sup> Factories Act, 1937. Section 46.

**SPECIAL HEALTH,  
SAFETY AND  
WELFARE  
PROVISIONS**

*Dust and Fumes.*<sup>69</sup> Dust, fumes, or other injurious or offensive impurities must be prevented from accumulating and means must be provided to prevent their being inhaled. Exhaust appliances must be provided where practicable, as near the source as possible, so as to prevent the dust, fume, or impurity entering the air of any workroom.

Internal combustion engines must be partitioned off from any workroom: the exhaust gases must be conducted into the open air.

*Meals in Certain Dangerous Trades.*<sup>70</sup> Employees must not eat, drink or remain during rest periods in any room where lead, arsenic or any other poisonous substance is used, or where a process is used giving rise to siliceous or asbestos dust.

*Protection of Eyes.*<sup>71</sup> Goggles or effective screens must be provided in the case of following processes:—<sup>72</sup>

Dry grinding of metals or articles of metal applied by hand to a revolving wheel or disc driven by mechanical power.

Turning (external or internal) of non-ferrous metals, or of cast iron, or of articles of such metals or such iron, where the work is done dry, other than precision turning where the use of goggles or a screen would seriously interfere with the work, or turning by means of hand tools.

Welding or cutting of metals by means of an electrical, oxy-acetylene or similar process,

and the following processes when carried on by means of hand tools or other portable tools:—

Fettling of metal castings involving the removal of metal.

Cutting out or cutting off (not including drilling or punching back) of cold rivets or bolts from boilers or other plant or from ships.

Chipping or scaling of boilers or ships' plates.

Breaking or dressing of stone, concrete or slag.

*Humid Factories.*<sup>73</sup> Special regulations govern conditions for factories in which artificial humidity is produced.

*Underground Rooms.*<sup>74</sup> With the exception of storage rooms, underground rooms, i.e. rooms of at least half height below surface level, may be certified by the Factory Inspector as unsuitable for working in. An underground room must not be put into use as a

<sup>69</sup> Factories Act, 1937. Section 47.

<sup>70</sup> *ibid.* Section 48.

<sup>71</sup> *ibid.* Section 49.

<sup>72</sup> S.R. & O., 1938. No. 654.

<sup>73</sup> *see* Factories Act, 1937. Section 52.

<sup>74</sup> Factories Act, 1937. Section 53.

workroom unless notice on a prescribed form<sup>76</sup> is given to the Factory Inspector, and no process of a hot, wet or fume nature must be carried on in it without his written consent.

*Laundries.*<sup>76</sup> Effective steps must be taken to regulate the temperature in ironing rooms, to carry away steam in wash-houses, and to separate stoves for heating irons from ironing rooms and tables.

Gas irons emitting noxious fumes are prohibited.

*Lifting Excessive Weights.*<sup>77</sup> A young person must not be employed to lift, carry or move any load so heavy as to be likely to cause injury to him.

*Prohibition of Employment on or near Certain Processes.*<sup>78</sup> Female young persons must not be employed in parts of factories where glass is melted or blown (except lamp blown glass), where glass is annealed (except plate or sheet glass), brine is evaporated in open pans, or salt is stoved.

The Minister may add to or exempt processes from these provisions.

*Lead Processes.*<sup>79</sup> Stringent regulations relating to processes connected with lead manufacture or involving the use of lead compounds are in force, and should be studied by the Production Engineer or Manager concerned with such processes.

*Special Regulations for Safety and Health.*<sup>80</sup> Where the Minister is satisfied that any manufacture, machinery, plant, equipment, appliance, process, or description of manual labour may cause risk of injury, he may make such special regulations as appear to him to be reasonably practicable and to meet the needs of the case. A list of these regulations is given in Appendix 4. Some of them, being of special interest to the Production Engineer and Manager, are now briefly referred to.

*Regulation for Casting of Brass.*<sup>81</sup> These regulations deal *inter alia* with the removal of fumes in the casting of brass, the spreading of fumes to other workshops, washing, cleaning and sanitary conditions in brass foundries, and prohibiting the use of female labour.

*Regulations for the use of Woodworking Machinery.*<sup>82</sup> These regulations deal *inter alia* with the provision of stopping and starting appliances, space and floor around machinery, lighting and

<sup>76</sup> S.R. & O., 1946. No. 2247.

<sup>76</sup> Factories Act, 1937. Section 55.

<sup>77</sup> *ibid.* Section 56.

<sup>78</sup> *ibid.* Section 57.

<sup>79</sup> *see* Factories Act, 1937. Sections 58 and 59. S.R. & O., 1921, No. 1713, 1714 and 1715.

<sup>80</sup> Factories Act, 1937. Section 60. Factories Act, 1948. Section 12.

<sup>81</sup> S.R. & O., 1908. No. 484.

<sup>82</sup> S.R. & O., 1922. No. 1196; 1927. No. 207; 1946, No. 258.



shading, underground rooms, temperatures, training of persons using woodworking machinery, fencing of circular saws and provision of push sticks and the guarding of plain band saws; they also deal with planing machines, vertical spindle moulding machines, and chain mortising machines. *Regulations for the Grinding or Glazing of Metals, or Processes incidental to the Grinding of Metals, or the Cleaning of Castings.*<sup>83</sup> These regulations deal *inter alia* with the removal of grinding dust and the provision of hoods, ducts and fans for dry grinding, adequate exhaust and inlet ventilation, or the supply of clean water conveyed by pipes and deposited on the surface of grindstones in the case of wet grinding; room limitations, hacking or rodding, sweeping of floors, walls and ceilings, spitting, notices specifying safe peripheral speeds, keeping a register of sweeping and cleaning done, rumbling and examination of plant. Portable grinding, glazing or buffing machines are exempted from certain dust removal and ventilation provisions.<sup>84</sup> Universal grinding machines and surface grinding machines are exempted from provisions relating to peripheral speeds if grinding wheels do not exceed 8 in. dia.<sup>85</sup> (see also S.I. 1950. No. 688).

*Regulations for Horizontal Milling Machines.*<sup>86</sup> These regulations deal *inter alia* with conditions of the floor, lighting, fencing of cutters, requirements of guards, starting and stopping appliances, suds and cutting lubricants, swarf removal and duties of operators to use guards and appliances.

Internal Milling, End Milling other than Face Milling, Automatic Gear Cutting, Hobbing and Profiling, as well as Thread Milling and milling with cutters on spindles  $2\frac{1}{2}$  in. dia. or arbors of more than 2 in. dia. are exempted from the guarding provisions, but still subject to the general Factories Act regulations regarding fencing of machinery. The same exemptions apply to milling operations for Jig, Tool and Gauge making for use in the factory, and accurate operations requiring unrestricted manipulation.<sup>87</sup>

**NOTIFICATION AND  
INVESTIGATION OF  
ACCIDENTS AND  
INDUSTRIAL  
DISEASES**

*Notification of Accidents and Dangerous Occurrences.*<sup>88</sup> Written notices in the prescribed form and accompanied by the prescribed particulars must be sent forthwith to the Factory Inspector under the following circumstances:—

<sup>83</sup> S.R. & O., 1925. No. 904.

<sup>84</sup> Cert. of Exemption No. 5. Grinding of Metals Regs. 1925.

<sup>85</sup> Cert. of Exemption No. 6. Grinding of Metals Regs. 1925.

<sup>86</sup> S.R. & O., 1928. No. 548.

<sup>87</sup> S.R. & O., 1934. No. 207.

<sup>88</sup> Factories Act, 1937. Section 64; and S.R. & O., 1947. No. 31.



- (1) Accidents causing loss of life.
- (2) Accidents disabling employees for more than three days.
- (3) Bursting of a revolving vessel, wheel, grindstone or grinding wheel moved by mechanical power.
- (4) Collapse or failure of a crane, derrick, winch, hoist, or other appliance used in raising or lowering persons or goods, or any part thereof (except the breakage of chain or rope slings), or the overturning of a crane.
- (5) Explosion or fire causing damage to the structure of any room or place in which persons are employed, or to any machine or plant contained therein, and resulting in the complete suspension of ordinary work in such room or place, or stoppage of machinery or plant for not less than five hours, where such explosion or fire is due to (i) the ignition of dust, gas or vapour, or (ii) the ignition of celluloid or substances composed wholly or in part of celluloid.
- (6) Electrical short circuit or failure of electrical machinery, plant, or apparatus, attended by explosion or fire or causing structural damage thereto, and involving its stoppage or disuse for not less than five hours.
- (7) Explosion or fire affecting any room in which persons are employed and causing complete suspension of ordinary work therein for not less than twenty-four hours.
- (8) Explosion of a receiver or container used for the storage at a pressure greater than atmospheric pressure of any gas or gases (including air) or any liquid or solid resulting from the compression of gas.

*Notification of Industrial Diseases.*<sup>89</sup> Written notice to the Factory Inspector and the Factory Doctor must be made in every case of lead, phosphorus, arsenical or mercurial poisoning, or anthrax, toxic jaundice,<sup>90</sup> epitheliomatous and chrome ulceration,<sup>91</sup> carbon bisulphide, aniline and chronic benzene poisoning,<sup>92</sup> manganese poisoning,<sup>93</sup> compressed air illness<sup>94</sup> and toxic anæmia.<sup>95</sup>

**EMPLOYMENT OF WOMEN AND YOUNG PERSONS** *General Considerations.* The Factories Acts deal *inter alia*, with hours of employment, work, intervals, overtime etc., of young persons of either sex between the ages of fifteen and eighteen and of some women. Not only are the regulations not applicable to men over eighteen, but they apply only to such women and young persons who are

<sup>89</sup> Factories Act, 1937. Section 66.

<sup>90</sup> S.R. & O., 1915. No. 1170.

<sup>91</sup> S.R. & O., 1919. No. 1775.

<sup>92</sup> S.R. & O., 1924. No. 1505.

<sup>93</sup> S.R. & O., 1936. No. 686.

<sup>94</sup> S.R. & O., 1938. No. 1386.

<sup>95</sup> S.R. & O., 1942. No. 196.

engaged, whether for wages or not, either on a process, or in cleaning any part used for any process, or in cleaning or oiling any part of machinery or plant, or in any other kind of work whatsoever incidental to, or connected with, the process, or connected with the article. Apprentices are included, but cleaners, employed solely on cleaning the factory (other than any cleaning which is incidental to, or connected with, a process),<sup>96</sup> and women holding responsible positions of management not ordinarily engaged in manual work,<sup>97</sup> are not included, (e.g. tea trolley girls, nurses, canteen girls, manageresses).

*Hours of Work.* Total HOURS WORKED<sup>98</sup> exclusive of intervals allowed for meals and rest must not, subject to certain exceptions, exceed nine in any day or 48 in any week (44 in the case of young persons under sixteen).

*The Period of Employment,* i.e. the time between clocking in and clocking out, inclusive of breaks, must not exceed 11 hours in any day and must be between 7 a.m. and 3 p.m. (6 p.m. in the case of young persons under sixteen),<sup>99</sup> or 1 p.m. on Saturdays.

*Spells of Work.* In general spells of work must be no longer than 4½ hours before an interval of at least one half-hour is allowed for rest or meal. The spell can, however, be increased to five hours if an interval of not less than ten minutes is allowed in the course of it.

*General Rules.* The periods of employment and intervals for meals and rest in a factory must be the same for all women and young persons, but young persons under sixteen may leave one hour earlier.

However, different Branches or Departments or Groups of work carried on in the SAME factory may be regarded as DIFFERENT factories for the purpose of periods of employment, if the employer holds a certificate from the District Inspector.<sup>100</sup> Each such Branch, Department or Group of work must be carried on in separate room or rooms, or in a part of the factory partitioned off, or distinguished by a definite line of demarcation, and no woman or young person employed in ONE such Branch, Department or Group is permitted to work in ANOTHER. Separate notices of hours of work, meals, etc., must be posted.

Periods of employment for young persons under sixteen need not be the same as those for other young persons and women employed in the factory, but such periods must generally be the same for all young persons under sixteen; different periods may

<sup>96</sup> Factories Act, 1937. Section 152.

<sup>97</sup> *ibid.* Section 79.

<sup>98</sup> *ibid.* Section 70.

<sup>99</sup> *ibid.* Section 71.

<sup>100</sup> S.R. & O., 1939. No. 1888.

however be fixed for two different sets of young persons or more sets if the written approval of the Factory Inspector has been obtained.<sup>101</sup>

No woman or young person must be employed during an interval for meals or rest.

Women and young persons must also not remain during intervals for meals or rest in a room where work is carried on.<sup>102</sup>

The above general rules are subject to certain exceptions.

*Notice of Hours of Employment.*<sup>103</sup> A notice of the period of employment for women and young persons for each day, including times of intervals for meals and rest, must be posted in the factory. Different periods of employment and different intervals can be fixed for different days of the week. Changes in the periods of employment can be made, but only once in three months, after notice has been given to the Factory Inspector and posted in the factory.

*Five Day Week.*<sup>104</sup> In the case of factories on a five day week, the total hours of work in any day can be ten, and the period of employment can be twelve. The maximum overtime allowed is  $10\frac{1}{2}$  working hours. Overtime on a Saturday (or other sixth day) is permitted up to  $4\frac{1}{2}$  working hours, provided no woman or young person has been employed on overtime work on any other day during that week.

*Overtime.*<sup>105</sup> Pressure of work in any factory may be dealt with by the overtime employment of women and young persons over sixteen. The maximum limit for such overtime is 100 hours in any year, or six hours in any week. Overtime may be worked in no more than 25 weeks per year.

Other conditions for overtime work are the limitation of hours of work in any day (exclusive of rests) to 10 ( $10\frac{1}{2}$  hours if factory on a five day week) and 12 hours between clocking-on and clocking-off. These must be between 7 a.m. and 8 p.m. in the case of young persons and between 7 a.m. and 9 p.m. in the case of women.

During any additional rest periods for women and young persons who are to work overtime, women and young persons not working such overtime may be allowed to work.

Before any woman or young person is allowed to work overtime on any day, the occupier of a factory must notify the Factory

<sup>101</sup> S.R. & O., 1940. No. 139.

<sup>102</sup> Factories Act, 1937. Section 76.

<sup>103</sup> *ibid.* Section 72.

<sup>104</sup> *ibid.* Section 82.

<sup>105</sup> *ibid.* Section 73.

Inspector and enter the prescribed details in the General Register, including details of additional rest periods. He must also post a notice containing such particulars in the factory.<sup>106</sup>

The Minister may vary these provisions in certain circumstances,<sup>107</sup>

- (1) In the case of seasonal or special pressure, he may increase the hours of work (otherwise 10 or 10½ hours) during not more than eight weeks, and he may increase the maximum number of overtime hours from 100 to 150 per year. These two extensions apply to women only, not to young persons.
- (2) In the case of any particular class of factory, owing to exigencies of the trade, or in the case of any particular factory by reason of unforeseen pressure of work due to sudden orders, or by reason of a breakdown of machinery or plant, or other unforeseen emergency, he may increase the aggregate number of hours of overtime employment per week, or the number of weeks in which overtime can be worked.

In calculating for any factory or department the aggregate hours of overtime employment, or the number of weeks in which overtime employment can take place, account must be taken of EVERY period during which ANY woman or young person is employed overtime in that factory or department.<sup>108</sup>

However, for the purpose of reckoning the hours of overtime employment, and the number of weeks in which overtime employment is permissible, the factory CAN be divided into DIFFERENT parts (or departments) or the employees into DIFFERENT sets.<sup>109</sup>

If divided into different parts, each part must consist of a separate room or rooms, or be separated by a partition, or be distinguished by a definite line of demarcation. No woman or young person who has been employed overtime in ONE part can be employed overtime in ANOTHER part during the same calendar year.

If employees are divided into separate sets, no woman or young person who has been employed overtime in ONE set can be employed overtime in ANOTHER set in the same calendar year.

Furthermore, if the nature of the business carried on in any class of factory involves overtime employment of DIFFERENT persons on DIFFERENT occasions to a considerable extent, permission can be given to refer overtime employment to the INDIVIDUAL, provided that no woman in the factory is employed overtime for more than 75 hours per year, and no young person for more than

<sup>106</sup> Factories Act, 1937. Section 74.

<sup>107</sup> *ibid.* Section 80.

<sup>108</sup> *ibid.* Section 73.

<sup>109</sup> S.R. & O., 1938. No. 640.

50 hours per year, and that no woman or young person is employed overtime for more than 6 hours in any week, or in more than 25 weeks.

Factories in which at the present time the Factory Inspector can approve schemes of INDIVIDUAL overtime are those in which the manufacture of a variety of light metal articles, or of fittings, or accessories composed wholly or largely of metal, is carried on.<sup>110</sup>

*Outside Work.*<sup>111</sup> On any day during which they are employed in a factory, women and young persons must not also be employed outside the factory; however, women and young persons over sixteen can be so employed in a SHOP but such employment is treated for calculation of hours, overtime, etc., as employment in the factory.

*Prohibition of Employment.*<sup>112</sup> Women and girls must not be employed within four weeks of child-birth.

*Sunday Work.*<sup>113</sup> Subject to special exceptions, Sunday work for women and young persons is prohibited either in a factory or on work connected with the business of the factory, or in any other business carried on by the occupier.

*Annual Holidays (England).*<sup>114</sup> The whole of Christmas Day, Good Friday and every Bank Holiday must be allowed as a holiday to every woman and young person, unless notice is given during the preceding three weeks that another weekday will be substituted. At least half of these whole holidays must be between 15th March and 1st October.

**SPECIAL EXCEPTIONS** Employers can avail themselves of a number of exceptions, but before doing so they must give seven days' notice to the Factory Inspector, giving details of periods of employment, intervals, etc. where they differ from ordinary circumstances. Notices giving the same details must also be posted in the factory.<sup>115</sup>

*Male Young Persons on Shift Work.*<sup>116</sup> Male young persons over sixteen employed in the following industries engaged on *continuous* processes can be employed on Sunday work outside the periods of employment already specified :—

The smelting of iron ore.

The manufacture of wrought iron, steel or tin-plate.

<sup>110</sup> S.R. & O. 1938. No. 1228.

<sup>111</sup> Factories Act, 1937. Section 75.

<sup>112</sup> *ibid.* Schedule 3.

<sup>113</sup> *ibid.* Section 77.

<sup>114</sup> *ibid.* Section 78.

<sup>115</sup> *ibid.* Section 97.

<sup>116</sup> *ibid.* Section 81.

Processes in which reverberatory or regenerative furnaces, necessarily kept in operation day and night in order to avoid waste of material and fuel, are used in connection with the smelting of ores, metal rolling, forges, or the manufacture of metal tubes or rods, or in connection with such other classes of work as may be specified by regulations by the Minister.

The galvanising of sheet metal or wire (except the pickling processes).

The manufacture of paper.

The manufacture of glass.

Such shifts may end on a Sunday morning not later than 6 a.m. or begin on Sunday evening after 10 p.m. In the case of a four shift system, young persons may be employed on shifts between 6 a.m. and 10 p.m. on Sundays. These exceptions are subject to the following conditions :—

- (a) The number of turns must not be more than six per week.
- (b) The interval between successive turns must be at least fourteen hours.
- (c) No young person must be employed between twelve midnight and 6 a.m. in two consecutive weeks.
- (d) The hours worked may exceed 48 in any week, but must not exceed 56 per week, or 144 in three successive weeks.
- (e) Overtime work is prohibited.
- (f)<sup>117</sup> Medical examination must take place and a certificate of fitness be issued within fourteen days by the Factory Doctor. Another certificate must be issued after three months and every six months thereafter. Medical examinations must be conducted at the factory.

*Two Shift System.*<sup>118</sup> The Minister may allow a two shift system of employment of women and young persons over sixteen between 6 a.m. and 10 p.m. (6 a.m. to 2 p.m. on Saturdays) if the majority of the work-people give their consent. In that case the average shift must not exceed 8 hours and 10 hours in the case of six day and five day weeks respectively. Total shifts must not exceed 48 hours per week or 88 hours per fortnight. Detailed regulations govern the method of consultation and the procedure of the secret ballot.

*Staggered Hours due to Electricity Emergency.*<sup>119</sup> The Electricity Supply (Hours, Safety and Welfare) Order and the Factories (Hours of Employment in Factories using Electricity) Order, made under the provisions of the Defence (General) Regulations 1939, and

<sup>117</sup> S.R. & O., 1938. No. 608.

<sup>118</sup> Employment of Women & Young Persons Act, 1936; and S.R. & O., 1936. No. 1367.

<sup>119</sup> S.R. & O., 1943, No. 187; 1947, No. 1870; and 1947, No. 2341.

Supplies and Services Acts, empower the District Inspector to permit staggered hours in factories using outside electricity. These orders regulate *inter alia* shift work schemes, staggering of hours of day work, different employment and working periods in different weeks, long afternoon spells, Saturday, Sunday and night work.

*Evening Work for Women.*<sup>120</sup> A recent order permits the evening employment of women under certain circumstances. The District Factory Inspector may issue a certificate in respect of a factory, particular departments, or processes of work. This certificate is subject to the following conditions :—

- (1) The period of employment for women affected shall neither begin before 5 p.m. nor end later than 10 p.m.
- (2) The spell of work must be no longer than  $4\frac{1}{2}$  hours unless an interval of 10 minutes or over is allowed.
- (3) Women so employed must not also be employed during the day or on Saturdays and Sundays.
- (4) Notice giving full particulars of hours, intervals etc., must be posted in the factory.

*Earlier Starting Hours.*<sup>121</sup> The Minister may, where exigencies of the trade or convenience of the employees require, allow by order the period of employment for women and young persons in a factory or department to start before 7 a.m. but not earlier than 6 a.m.

*Time of Meal Breaks.*<sup>122</sup> Persons on continuous processes or DIFFERENT sets of persons employed on DIFFERENT processes, or DIFFERENT sets of persons divided for the purpose of staggering canteen meals are exempted from the general rule that all women and young persons must have the same meal and rest breaks.

*Employment during Breaks.*<sup>123</sup> Male young persons engaged on the manufacture of wrought iron, steel or tin-plate, paper or glass are exempted from the general rule that no women and young persons must work during breaks of others.

*Use of Rooms during Breaks.*<sup>124</sup> Persons on continuous processes, staggered in groups for meals or rest during intervals allowed in the course of the spell of continuous employment, are exempted from the general rule prohibiting the use of a workroom during meal and rest breaks.

*Continuous Employment of Young Persons with Men.*<sup>125</sup> Male young persons over sixteen who are employed with men on continuous work can have the length of spell increased to five hours.

<sup>120</sup> S.I., 1950. 1837.

<sup>121</sup> Factories Act, 1937. Section 83.

<sup>122</sup> *ibid.* Section 84.

<sup>123</sup> *ibid.* Section 85.

<sup>124</sup> *ibid.* Section 86.

<sup>125</sup> *ibid.* Section 87.



*Employment on Repairing Work.*<sup>126</sup> Male young persons who are part of the regular maintenance staff on factory, machinery or plant repair are exempted from the regulation appertaining to hours of work and employment, overtime, prohibition of rooms during breaks, and prohibition of Sunday and holiday work.

*Staggered Holidays.*<sup>127</sup> The Minister may permit, in certain circumstances, staggered whole holidays on different days.

*Special Industries.*<sup>128</sup> The employment of women and young persons in Laundries, Bread, Flour, Confectionery, Sausage Manufacture, Fish, Fruit, or Vegetable preservation, and treatment and processes involving milk, are subject to special provisions.

*Other Exceptions.*<sup>129</sup> Different intervals for women and young persons, special provisions for Saturday work, and different holidays for different sets of women and young persons are applicable in certain trades.

*Young Persons Employed Outside the Factory.*<sup>130</sup> Young persons employed in collecting, carrying and delivering of goods and messages, or in running errands wholly or mainly outside the factory are subject to special provisions.

*Certificate of Fitness.*<sup>131</sup> No young person under the age of eighteen may be employed longer than fourteen days without having been examined by the Factory Doctor ; after that he must be examined at least once every twelve months. A certificate of fitness containing prescribed details must be entered in or attached to the General Register. The Factory Doctor may either refuse this certificate or stipulate certain conditions. If the Doctor requires any further information or further time for consideration he can issue provisional certificates allowing employment of up to twenty-one days.

Young persons must not be employed without a certificate of fitness, or not in accordance with the special conditions stipulated by the Factory Doctor.

**MISCELLANEOUS PROVISIONS** *Notices.* At all principal entrances must be posted in conveniently readable positions:—<sup>132</sup>

- (a) A prescribed abstract of the Factories Act, 1937.
- (b) A notice of the address of the Inspector for the district and the Superintending Inspector for the division.
- (c) A notice of the name and address of the Factory Doctor.

<sup>126</sup> Factories Act, 1937. Section 88.

<sup>127</sup> *ibid.* Section 90.

<sup>128</sup> *ibid.* Section 92. See also Appendix and Factories Act, 1948. Section 13.

<sup>129</sup> S.R. & O., 1938, No. 607 ; 1940, No. 109 ; 1947, No. 184.

<sup>130</sup> Factories Act, 1937. Section 89.

<sup>131</sup> *ibid.* Section 99 ; and Factories Act, 1948. Sections 1 and 2.

<sup>132</sup> Factories Act, 1937. Section 114.



(d) A notice specifying the clock by which periods of employment, rest periods etc., are regulated, (e.g. Big Ben).

(e) Every notice and document required to be posted.

*Abstracts of Special Regulations.*<sup>133</sup> Prescribed abstracts of special regulations, where applicable, must also be posted, and copies of such regulations must, on request, be given to the workers affected.

*General Register.*<sup>134</sup> A General Register containing *inter alia* particulars of young persons, whitewashing, etc., accidents etc., special exceptions, reports on boilers, chains, etc., must be kept.

*Returns to the Factory Inspector.*<sup>135</sup> Periodical returns, at not longer than annual intervals, must be sent to the Factory Inspector, giving details of the number of employees in the factory, and particulars as to hours of employment of women and young persons, age, sex and occupation of all employees etc.

## APPENDICES

### APPENDIX I.

#### Industries in which Special Regulations for Unfenced Machinery Apply

(Contained in S.R. & O., 1946. No. 156).

1. All processes in the manufacture of :—
  - (a) beet sugar.
  - (b) paper or paper-board.
  - (c) viscose transparent paper or film.
  - (d) flour from wheat.
  - (e) provender and compound foodstuffs for animal feeding.
  - (f) sodium carbonate by the ammonia soda or Solvay process.
  - (g) caustic soda by the ammonia soda or Solvay process, or by continuous causticising.
  - (h) sulphur dioxide.
  - (i) sodium hyposulphite ("hydrosulphite") or sodium sulphonylate.
  - (j) inlaid linoleum.
2. All processes in the milling of cereals, seeds or nuts.
3. All processes in the extraction of oil or other similar products from cereals or seeds.
4. The filtering process in the manufacturing of sulphate of ammonia.
5. The phosphate reaction pumping process in the manufacture of concentrated fertiliser.
6. The electrolytic process for the manufacture of metallic sodium as regards the operation of dredging the sodium cells.
7. The electrolytic process for the manufacture of caustic soda.
8. Any manufacturing process in which a mixture of nitric and sulphuric acids is employed, and where risk of fire or explosion would arise if the transmission machinery were stopped.

<sup>133</sup> Factories Act, 1937. Section 115.

<sup>134</sup> *ibid.* Section 116.

<sup>135</sup> *ibid.* Section 118.

9. The reducing, volatilising and decomposing processes in the production of nickel.
10. Any process in the manufacture of phosphorus halides directly from phosphorus involving risk of considerable rise in temperature, and of evolution of toxic gases if the transmission machinery were stopped.
11. The process of enamelling wire including re-winding after enamelling.
12. The kier process in the manufacture of aluminium from bauxite.

## APPENDIX 2.

### First Aid

*Extracts from the First Aid in Factories Order, 1938, dated May 5, 1938. S.R. & O., 1938. No. 486.*

A.—For factories in which the number of persons employed does not exceed ten or (in the case of factories in which mechanical power is not used) does not exceed fifty persons.—Each first-aid box or cupboard shall contain at least :—

1. A copy of the first-aid leaflet (Form 923) issued by the Factory Department of the Home Office.
2. A sufficient number (not less than six) of small sterilised dressings for injured fingers.
3. A sufficient number (not less than three) of medium size sterilised dressings for injured hands or feet.
4. A sufficient number (not less than three) of large sterilised dressings for other injured parts.
5. A sufficient number of sterilised burn dressings (small and large).
6. A two per cent. alcoholic solution of iodine or a one per cent. aqueous solution of gentian violet.
7. A bottle of sal volatile, having the dose and mode of administration indicated on the label.

B.—For factories in which mechanical power is used and in which the number of persons employed exceeds ten but does not exceed fifty.—Each first-aid box or cupboard shall contain at least :—

1. A copy of the first-aid leaflet (Form 923) issued by the Factory Department of the Home Office.
2. A sufficient number (not less than a dozen) of small sterilised dressings for injured fingers.
3. A sufficient number (not less than six) of medium size sterilised dressings for injured hands or feet.
4. A sufficient number (not less than six) of large sterilised dressings for other injured parts.
5. A sufficient number of sterilised burn dressings (small and large).
6. A sufficient supply of sterilised cotton wool, in  $\frac{1}{2}$  oz. packets.
7. A two per cent. alcoholic solution of iodine or a one per cent. aqueous solution of gentian violet.
8. A bottle of sal volatile, having the dose and mode of administration indicated on the label.

9. Eye drops, prepared as described in the first-aid leaflet (Form 923).

C.—For factories employing more than fifty persons.—Each first-aid box or cupboard shall contain at least :—

1. A copy of the first-aid leaflet (Form 923) issued by the Factory Department of the Home Office.
2. A sufficient number (not less than two dozen) of small sterilised dressings for injured fingers.
3. A sufficient number (not less than one dozen) of medium size sterilised dressings for injured hands or feet.
4. A sufficient number (not less than one dozen) of large sterilised dressings for other injured parts.
5. A sufficient number of sterilised burn dressings (small and large).
6. A sufficient supply of sterilised cotton wool, in  $\frac{1}{2}$  oz. packets.

7. A two per cent. alcoholic solution of iodine or a one per cent. aqueous solution of gentian violet.
8. A bottle of sal volatile, having the dose and mode of administration indicated on the label.
9. Eye drops prepared as described in the first-aid leaflet (Form 923).
10. A supply of suitable splints and cotton wool or other material for padding.
11. A supply of adhesive plaster.
12. A tourniquet.
13. One dozen roller bandages.
14. Half-a-dozen triangular bandages.
15. Safety pins.

Provided that items (10) to (15) inclusive need not be included in the standard first-aid box or cupboard (a) where there is a properly equipped ambulance room, or (b) if at least one box containing such items and placed and maintained in accordance with the requirements of Section 45 of the said Act is separately provided.

D.—In lieu of the dressings required under items (2) and (3), there may be substituted adhesive wound dressings approved by certificate of the Chief Inspector of Factories.

E.—In all cases, all materials for dressings contained in the first-aid boxes or cupboards, shall be those designated in, and of a grade or quality not lower than the standards prescribed by, the British Pharmaceutical Codex, or any supplement thereto.

F.—Each first-aid box or cupboard shall be distinctively marked. If newly provided after the date of this order it shall be marked plainly "FIRST AID."

#### APPENDIX 3.

#### Welfare Regulations for Particular Trades

The Factories Act, 1937 (Extension of Section 46) Regulations, 1948. S.I. 1938. No. 707.

Tin or Terne Plates.—Order, dated 5th October, 1917, for securing the welfare of the workers in factories in which the manufacture of tin, or terne plates is carried on. S.R. & O., 1917. No. 1035.

Blast furnaces, copper mills, iron mills, foundries and metal works.—Orders dated 12th October, 1917, in regard to Ambulance and First Aid arrangements at Blast Furnaces, Copper Mills, Iron Mills, Foundries, and Metal Works. S.R. & O., 1917. No. 1067.

Tanning (Two-Bath Processes).—Order dated 22nd March, 1918, for securing the welfare of the workers employed in factories or parts of factories in which Bichromate of Potassium or Sodium is used in Tanning by the "Two-Bath" process. S.R. & O., 1918. No. 368.

Dyeing.—Order, dated 22nd March, 1918, for securing the welfare of the workers employed in factories or parts of factories in which Bichromate of Potassium or Sodium is used in dyeing other than Job-dyeing. S.R. & O., 1918. No. 369.

Glass Bottles and Pressed glass articles.—Order, dated 15th May, 1918, for securing the welfare of the workers employed in factories or parts of factories in which the manufacture of (i) glass bottles or (ii) pressed glass articles is carried on. S.R. & O., 1918. No. 558.

Saw mills and woodworking factories.—Order, dated 9th November, 1918, in regard to Ambulance and First Aid arrangements at Saw Mills and Factories in which articles of wood are manufactured. S.R. & O., 1918. No. 1489.

Fruit preserving.—Order, dated 15th August, 1919, for securing the welfare of the workers employed in factories or parts of factories in which the preserving of fruit is carried on. S.R. & O., 1919. No. 1136.

Laundries.—Order, dated 23rd April, 1920, for securing the welfare of the workers employed in Laundries. S.R. & O., 1920. No. 654.

Gut-scraping etc.—Order dated 28th July, 1920, for securing the welfare of the workers employed in gut-scraping, gut-washing and processes incidental thereto ; and the preparation and dressing of tripe. S.R. & O., 1920. No. 1437.

Herring Curing. (Norfolk and Suffolk).—Order, dated 9th September, 1920 for securing the welfare of the workers employed in factories and workshops situated in the counties of Norfolk and Suffolk, in which the processes of gutting salting and packing of herrings are carried on. S.R. & O., 1920. No. 1662.

Glass Bevelling.—Order, dated 3rd March, 1921, for securing the welfare of the workers employed in factories or parts of factories in which the bevelling of glass and processes incidental thereto are carried on. S.R. & O., 1921. No. 288.

Hollow-ware and galvanising.—The Hollow-ware and Galvanising Welfare Order, 1921. S.R. & O., 1921. No. 2032.

Herring Curing (Scotland).—The Herring Curing (Scotland) Welfare Order, 1926. S.R. & O., 1926. No. 535.

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Bakehouses.—The Bakehouses Welfare Order, 1927. S.R. & O., 1927. No. 191.  
Herring Curing (England and Wales).—The Herring Curing Welfare Order, 1927. S.R. & O., 1927. No. 813.

Sacks.—The Sacks (Cleaning and Repairing) Welfare Order, 1927. S.R. & O., 1927. No. 860.

Biscuit Factories.—The Biscuit Factories Welfare Order, 1927. S.R. & O., 1927. No. 872.

Oil Cake Mills.—The Oil Cake Welfare Order, 1929. S.R. & O., 1929. No. 534.

Cement Works.—The Cement Works Welfare Order, 1930. S.R. & O., 1930. No. 94. Factories Miscellaneous Welfare Order, 1951. S.I. 926.

Tanning.—The Tanning Welfare Order, 1930. S.R. & O., 1930. No. 312.  
Sugar Factories.—The Sugar Factories Welfare Order, 1931. S.R. & O., 1931. No. 684.

Clay Works.—The Clay Works (Welfare) Special Regulations, 1948. S.I., 1948. No. 1547.

#### APPENDIX 4.

#### List of Factory Orders made under Health (General provisions) Sections of the Factories Acts.

Cleanliness.—The Factories (Cleanliness of walls and ceilings) Order, 1938, dated 5th May, 1938. S.R. & O., 1938. No. 487.

Cleanliness.—The Factories (Cleanliness of walls and ceilings) (Amendment) Order, 1948. S.I. 1948. No. 1674.

Cubic Space.—Order, dated 30th December, 1903, modifying the proportion of cubic feet of space to be provided in certain Bakehouses. S.R. & O., 1903. No. 1157.

Lighting.—The Factories (Standards of Lighting) Regulations, 1941, dated 14th January, 1941, prescribing a standard of lighting for certain factories. S.R. & O., 1941. No. 94.

Lighting.—The Factories (Standards of Lighting) Regulations, 1941, dated 14th January, 1941, prescribing a standard of lighting for certain factories. Certificate of Exemption : Chemical Works.

Lighting.—The Factories (Standards of Lighting) Regulations, 1941, dated 14th January 1941, prescribing a standard of lighting for certain factories. Certificate of Exemption : Danger Buildings of Explosive Works.

Lighting.—The Factories (Standards of Lighting) Regulations, 1941, dated 14th January, 1941, prescribing a standard of lighting for certain factories. Certificate of Exemption : Rope Walks.

Lighting.—The Factories (Standards of Lighting) Regulations, 1941, dated 14th January, 1941, prescribing a standard of lighting for certain factories. Certificate of Exemption : Oil Seed Crushing Mills.

Sanitary Conveniences.—The Sanitary Accommodation Regulations, 1938, dated 24th June, 1938. S.R. & O., 1938. No. 611.

The Local Authorities (Transfer of Enforcement) Order, 1938, dated 5th May, 1938. S.R. & O., 1938. No. 488.

The Local Authorities (Transfer of Enforcement) (Amendment) Order, 1950. S.I., 1950. No. 842.

#### APPENDIX 5.

### List of Factory Orders made under the Safety (General Provisions) Sections of the Factories Acts

Unfenced Machinery.—The Operations at Unfenced Machinery Regulations, 1938, dated 30th June, 1938. S.R. & O., 1938. No. 641.

Unfenced Machinery.—The Operations at Unfenced Machinery (Amendment Schedule) Regulations, 1946, dated 30th January, 1946. S.R. & O., 1946. No. 156.

Training of Young Persons.—The Dangerous Machines (Training of Young Persons) Order, 1938, dated 5th May, 1938. S.R. & O., 1938. No. 485.

Hoists and Lifts.—The Hoists Exemption Order, 1938, dated 5th May, 1938. S.R. & O., 1938. No. 489.

Hoists and Lifts.—The Hoists Exemption (Amendment) Order, 1946, dated 18th November, 1946. S.R. & O., 1946. No. 1947.

Chains, Ropes and Lifting Tackle.—The Chains, Ropes and Lifting Tackle (Register) Order, 1938, dated 16th June, 1938. S.R. & O., 1938. No. 599.

Cranes and other Lifting Machines.—The Cranes and other Lifting Machines (Register of Examinations) Order, 1938, dated 16th June, 1938. S.R. & O., 1938. No. 600.

Breathing Apparatus.—The Breathing Apparatus, Etc. (Report on Examination) Order, 1949. S.I. 1949. No. 189.

Gasholders.—The Gasholders (Record of Examinations) Order 1938, dated 16th June, 1938. S.R. & O., 1938. No. 598.

#### *Certificates of Exemption issued under Sections 23, 28 and 32 of the Factories Act, 1937.*

Certificate of Exemption No. 1.—Annealing.

Certificate of Exemption No. 2.—(General). Welding Operations on Water-sealed Gasholders.

Certificate of Exemption No. 3.—(General). Cutting and Welding Operations on Steel or Wrought Iron Gas Mains and Services.

Certificate of Exemption No. 4.—(General). Welding Operations on Water-sealed Gasholders other than those used for the supply of Town gas.

Certificate of Exemption No. 5.—(General). Cutting and Welding Operations on Steel or Wrought Iron Gas Mains and Services, other than those used for the supply of Town Gas.

Certificate of Exemption No. 6.—(General). Steam Boilers, Steam Tube Ovens and Steam Tube Hotplates.

Certificate of Exemption No. 7.—(General). Steam Receivers.

Certificate of Exemption No. 8.—(General). Internal Cleaning and examination of oil storage tanks for multiple-head oil fountains.

Certificate of Exemption No. 9.—(General). Steam Boilers, Autoclaves and Vulcanisers.

Certificate of Exemption No. 10.—(General). Fire Engine Steam Boilers.

Certificate of Exemption No. 12.—(General). Steam Receivers, Thick rolls.

Certificate of Exemption No. 13.—(General). Steam Receivers. Safe working pressure slightly below the maximum permissible working pressure of the boiler.

Certificate of Exemption No. 14.—(General). Welding Operations on Oil Tanks of Ships.

Certificate of Exemption No. 15.—(General). Steam Boilers, Calorifier type.

Certificate of Exemption No. 16.—(General). Steam Boilers, Low pressure cast iron sectional for steam heating.

Certificate of Exemption No. 17.—(General). Steam Receivers. Traps Separators or Dryers, Strainers, De-Superheaters and Oil Separators.

Certificate of Exemption No. 18—(General). Steam Boilers, Cylindrical Multi-tubular type fired by town gas or oil.

Certificate of Exemption No. 19—(General). Steam Receivers, Miscellaneous types.

Certificate of Exemption No. 20—(General). Steam Receivers, Milk Pre-heaters, Pasteurisers and Sterilisers.

Certificate of Exemption No. 21—(General). Steam Boilers, Economisers of the steaming type.

Certificate of Exemption No. 22—(General). Air Receivers, Fire Sprinkler Installations.

Certificate of Exemption No. 23—(General). Air Receivers, Monotype machines.

Certificate of Exemption No. 24—(General). Steam Boilers and Steam Receivers apparatus with closed steam system for heating platen.

Certificate of Exemption No. 25—(General). Steam Receivers, Miscellaneous types.

Certificate of Approval No. 1.—Issued under Section 29 of the Factories Act, 1937. (General). Externally fired egg-ended steam boilers.

#### APPENDIX 6.

##### **List of Factory Orders made under the Welfare (General Provisions) Sections of the Factories Acts**

First Aid.—The First Aid in Factories Order, 1938, dated 5th May, 1938. S.R. & O., 1938. No. 486.

First Aid Regulations.—The First Aid Regulations, 1937, dated 10th August, 1937. S.R. & O., 1937. No. 769.

First Aid Welfare.—The First Aid Welfare Order, 1937, dated 10th August, 1937. S.R. & O., 1937. No. 770.

Standard for First-Aid Boxes.—Order, dated 25th September, 1934, under No. 4 (a) of the Docks Regulations, 1934 (S.R. & O., 1937. No. 769), prescribing the standard for first-aid boxes or cupboards provided in pursuance of that regulation.

Building Operations.—The Building Operations (First-Aid and Ambulance Room Equipment) Order, 1948. S.I. 1948. No. 2372.  
(See also Appendix 3).

#### APPENDIX 7.

##### **List of Factory Orders made the Health, Safety and Welfare (Special Provisions and Regulations) Sections of the Factories Acts**

Protection of Eyes.—The Protection of Eyes Regulations, 1938, dated 5th July, 1938. S.R. & O., 1938. No. 654.

Underground rooms.—The Work in Underground Rooms (Form of Notice) Order, 1946, dated 30th December, 1946. S.R. & O., 1946. No. 2247.

Lead Processes (Employment of Women and Young Persons).—Order, dated 8th November, 1921, as to the meaning of the expression "Lead Compound" and the method of ascertaining whether any compound is a "Lead Compound" for the purposes of the Act. S.R. & O., 1921. No. 1713.

Lead Processes (Employment of Women and Young Persons).—Order dated, 8th November, 1921, prescribing the medical examination of women and young persons employed in processes involving use of lead compounds. S.R. & O., 1921. No. 1714.

Lead Processes (Employment of Women and Young Persons).—Order, dated 8th November, 1921, prescribing the cloakroom, messroom and washing accommodation to be provided in factories and workshops in which women and young persons are employed in processes involving the use of lead compounds. S.R. & O., 1921. No. 1715.

APPENDIX B.

**List of Regulations for Safety and Health in Particular Trades**

- Aerated Water.—For the Manufacture of Aerated Water. S.R. & O., 1921. No. 1932.
- Asbestos.—For the Asbestos Industry. S.R. & O., 1931. No. 1140.
- Blasting (Castings and other articles). The Blasting (Castings and Other Articles) Special Regulations, 1949. S.I. 1949. No. 2225.
- Brass.—For the casting of brass. S.R. & O., 1908. No. 484.
- Bronzing.—For Bronzing with dry metallic powders in Letterpress printing, Lithographic printing and coating of metal sheets. S.R. & O., 1912. No. 361.
- Building.—The Building (Safety, Health and Welfare) Regulations, 1948. S.I., 1948. No. 1145.
- Building.—The Building (Safety, Health and Welfare) Regulations, 1948. Exemption Certificate, Steeplejacks' etc.
- Building.—Building 1950, Health and Welfare (Amendment) Regulations, 1951. (In preparation).
- Celluloid.—For the Manufacture, Manipulation and Storage of Celluloid or any article wholly or partly made of celluloid. (These regulations no longer apply to factories or parts thereof which are subject to the Manufacture of Cinematograph Film Regulations, 1928, or the Cinematograph Film Stripping Regulations, 1939). S.R. & O., 1921. No. 1825.
- Cellulose Solutions.—The Cellulose Solutions Regulations, 1934, dated 13th September, 1934. S.R. & O., 1934, No. 990.
- Cellulose Solutions.—The Cellulose Solutions Regulations, 1934, dated 13th September, 1934. Certificate of Exemption: Regs. Nos. 3, 4 and 6.
- Chemical Works.—For Chemical Works. S.R. & O., 1922. No. 731.
- Chromium Plating.—For the Electrolytic Plating or Oxidation of Metal Articles by the use of an Electrolyte containing Chromic Acid or other Chromium Compounds. S.R. & O., 1931. No. 455.
- Cinematograph.—For the Manufacture, repair, manipulation, use or storage of Cinematograph film. S.R. & O., 1928. No. 82.
- Cinematograph Film Stripping.—The Cinematograph Film Stripping Regulations, 1939, dated 17th May, 1939. S.R. & O., 1939. No. 571.
- Cotton Cloth.—Cotton Cloth Factories Regulations, 1929. S.R. & O., 1929. No. 300.
- Cotton Cloth.—Cotton Cloth Factories Regulations, 1929. Hygrometers order.
- Docks.—For the processes of loading, unloading, moving and handling goods in, on, or at any Dock, Wharf or Quay, and the processes of loading, unloading and coaling any ship in any Dock, Harbour, or Canal. S.R. & O., 1925. No. 231.
- Docks.—For the processes of loading, unloading, moving and handling goods in, on, or at any Dock, Wharf or Quay, and the processes of loading, unloading and coaling any ship in any Dock, Harbour, or Canal. Certificate of Exemption No. 1.—Annealing. Certificate of Exemption No. 2.—Manner of Test of Lifting Gear before being taken into use.
- Dry Cleaning.—The Dry Cleaning Special Regulations, 1949. S.I. 1949. No. 2224.
- Electric Accumulators.—For the Manufacture or repair of Electric Accumulators, or parts thereof. S.R. & O., 1925. No. 28.
- Electricity.—For the Generation, Transformation, Distribution and Use of Electrical Energy. S.R. & O., 1908. No. 1312.
- Electricity.—The Electricity (Factories Act) Special Regulations, 1927, dated 12th June, 1944. S.R. & O., 1944. No. 739.
- Enamelling.—For Vitreous Enamelling of Metal or Glass. S.R. & O., 1908. No. 1258.
- Felt Hats.—For the Manufacture of Felt Hats, where any inflammable solvent is used. S.R. & O., 1902. No. 623.
- File-cutting.—For the process of file-cutting by hand. S.R. & O., 1903. No. 507.



Flax and Tow.—For the processes of Spinning and Weaving Flax and Tow and the processes incidental thereto. S.R. & O., 1906. No. 177.

Foundries.—The Foundries (Parting Materials) Special Regulations, 1950. S.I., 1950. No. 1700.

Grinding.—Grinding or Glazing or processes incidental to Grinding in, or incidental to, the Manufacture of Cutlery, Edge Tools, Swords, Bayonets, Files, Saws, Ploughs or other cutting or piercing implements of iron or steel. S.R. & O., 1925. No. 1089.

Grinding.—The Grinding of Cutlery and Edge Tools (Amendment) Special Regulations, 1950. S.I. 1950. No. 370.

Grinding of Metals.—For the Grinding or Glazing of Metals, or processes incidental to the Grinding of Metals, or the Cleaning of Castings. S.R. & O., 1925. No. 904.

Grinding of Metals.—The Grinding of Metals (Miscellaneous Industries) (Amendment) Special Regulations, 1950. S. I. 1950. No. 688.

Grinding of Metals.—The Grinding of Metals (Miscellaneous Industries) (Amendment) Special Regulations, 1950. Certificate of Exemption No. 5.

Grinding of Metals.—The Grinding of Metals (Miscellaneous Industries) (Amendment) Special Regulations, 1950. Certificate of Exemption No. 6.

Hemp.—For the processes of Spinning and Weaving Hemp, or Jute, or Hemp or Jute Tow, and processes incidental thereto. S.R. & O., 1907. No. 660.

Hides and Skins.—For the handling of Hides and Skins. S.R. & O., 1921. No. 2076.

Horizontal Milling Machines.—For Horizontal Milling Machines. S.R. & O., 1928. No. 548.

Horizontal Milling Machines.—The Horizontal Milling Machines (Amendment) Regulation, 1934, dated 27th February, 1934. S.R. & O., 1934. No. 207.

Horsehair.—For the use of Horsehair. S.R. & O., 1907. No. 984.

Indiarubber.—For certain processes incidental to the manufacture of indiarubber and of articles and goods made wholly or partially of indiarubber. S.R. & O., 1922. No. 329.

Jute.—The Jute (Safety, Health and Welfare) Regulations, 1948. S.I. 1948. No. 1696.

Kiers.—The Kiers Regulations, 1938, dated 11th February, 1938, for Kiers used for the purpose of boiling textile material in Print Works, Bleaching and Dyeing Works or Works in which Cotton or Cotton Waste is bleached.

Lead.—For the Smelting of Materials containing Lead, the Manufacture of Red or Orange Lead, and the Manufacture of Flaked Litharge. S.R. & O., 1911. No. 752.

Lead.—For the Manufacture of Certain Compounds of Lead, namely, any Carbonate, Sulphate Nitrate, or Acetate of Lead. S.R. & O., 1921. No. 1443.

Locomotives.—For use of Locomotives and Waggon on lines and sidings in or used in connection with premises under the Factory and Workshop Act, 1901 S.R. & O., 1906. No. 679.

Luminising.—The Factories (Luminising) Special Regulations, 1947, dated 7th May, 1947. S.R. & O., 1947. No. 865.

Magnesium.—The Magnesium (Grinding of Castings and other articles) Special Regulations, 1946, dated 10th December, 1946. S.R. & O., 1946. No. 2107.

Mules.—For the process of spinning by Self-Acting Mules. S.R. & O., 1905. No. 1103.

Paints and colours.—For the Manufacture of Paints and Colours. S.R. & O., 1907. No. 17.

Patent Fuel Manufacture.—The Patent Fuel Manufacture (Health and Welfare) Special Regulations, 1946, dated 25th February, 1946. S.R. & O., 1946. No. 258.



Pottery.—The Pottery (Health) Special Regulations 1947, dated 7th October, 1947. S.R. & O., 1947. No. 2161.

Pottery.—The Pottery (Health and Welfare) Special Regulations, 1950. S.I. 1950. No. 65.

Refractory Materials.—For the Handling, Moving, Breaking, Crushing, Grinding or Sieving of Refractory Material, and processes in the Manufacture of Silica Bricks. S.R. & O., 1931. No. 359.

Shipbuilding.—For the Construction and Repair of Ships in Shipbuilding Yards. S.R. & O., 1931. No. 133.

Vehicle painting.—For the Painting of Vehicles. S.R. & O., 1926. No. 299.

Tinning.—For the Tinning of Metal Hollow-ware, Iron Drums, and Harness Furniture. S.R. & O., 1909. No. 720.

Woodworking Machinery.—For the use of Woodworking Machinery. S.R. & O., 1922. No. 1196.

Woodworking Machinery.—To amend the Woodworking Machinery Regulations, 1922. S.R. & O., 1927. No. 207.

Woodworking.—The Woodworking (Amendment of Scope) Special Regulations, 1945, dated 28th September, 1945. S.R. & O., 1945. No. 1227.

Wool.—For the use of East Indian Wool. S.R. & O., 1908. No. 1287.

Wool.—For the processes of sorting, willeying, washing, combing, and carding wool, goat hair, and camel hair, and processes incidental thereto. S.R. & O., 1905. No. 1293.

Woollen and Worsted Textiles.—For the Manufacture, Dyeing or Finishing of Woollen or Worsted Textiles of any process or operation ancillary or incidental thereto. S.R. & O., 1926. No. 1463.

Yarn.—For the Heading of Yarn Dyed by means of a Lead Compound. S.R. & O., 1907. No. 616.

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- (a) Order, dated 24th December, 1926, modifying the application of certain provisions of the Factory and Workshop Act, 1901, in cases where persons are employed in painting buildings. S.R. & O., 1926. No. 1620.
- (b) Rule, dated 24th December, 1926, as to the method of treatment to be applied for the purpose of ascertaining whether any paint or other materials used in painting is "Lead Paint" within the meaning of the Act. S.R. & O., 1926. No. 1621.
- (c) Order dated 14th November, 1927, in respect of the employment of Young Persons as Apprentices in the Painting Trade, and of Women and Young Persons in work of Decorative Design. S.R. & O., 1927. No. 1094.
- (d) The Lead Paint Regulations, 1927. S.R. & O., 1927. No. 847.

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Dangerous Occurrences.—The Dangerous Occurrences (Notification) Regulations, 1947, dated 7th January, 1947. S.R. & O., 1947. No. 31.

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- (a) Toxic Jaundice.—Order dated 27th November, 1915. S.R. & O., 1915. No. 1170.
- (b) Epitheliomatous and Chrome Ulceration.—Order dated 28th November, 1919. S.R. & O., 1919. No. 1775.
- (c) Carbon Bisulphide, Aniline, and Chronic Benzene Poisoning.—Order dated 31st December, 1924. S.R. & O., 1924. No. 1505.
- (d) Manganese Poisoning.—The Factory and Workshop (Notification of Diseases) Order, 1936, dated 29th June, 1936. S.R. & O., 1936. No. 686.

- (e) Compressed Air Illness.—The Factories (Notification of Diseases) Regulations, 1938, dated 15th November, 1938. S.R. & O., 1938. No. 1386.
- (f) Toxic Anæmia.—The Factories (Notification of Diseases) Regulations, 1942, dated 26th January, 1942. S.R. & O., 1942. No. 196.

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Felt Hat Industry.—Order, dated 16th September, 1939, in relation to the Felt Hat Industry. S.R. & O., 1939. No. 1220.

Flax Textile Industry.—Order dated 4th August, 1939, in relation to the Flax Textile Industry. S.R. & O., 1939. No. 867.

Pottery and Clay Industries.—The Weekly Hours of Young Persons under Sixteen in Factories (Pottery and Clay Industries) Order, 1946, dated 13th November, 1946. S.R. & O., 1946. No. 1925.

Rope, Twine and Net Industry.—Order, dated 4th August, 1939, in relation to the Rope, Twine and Net Industry. S.R. & O., 1939. No. 868.

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Beer, Wines and Spirits.—The Bottling of Beer, Wines and Spirits (Overtime) Regulations, 1940, dated 10th May, 1940. S.R. & O., 1940. No. 729.

Bread, Flour, Confectionery.—The Bread, Flour, Confectionery and Sausage Manufacture (Overtime) Regulations, 1939, dated 4th May, 1939. S.R. & O., 1939. No. 509.

Chocolate and Sugar Confectionery.—The Chocolates and Sugar Confectionery (Overtime) Regulations, 1938, dated 17th October, 1938. S.R. & O., 1938. No. 1245.

Dyeing and Cleaning.—The Dyeing and Cleaning (Overtime) Regulations, 1939, dated 16th June, 1939. S.R. & O., 1939. No. 642.

Florists.—The Florists (Overtime) Regulations 1938, dated 23rd September, 1938. S.R. & O., 1938. No. 1163.

Glass Bottles and Jars.—The Glass Bottles and Jars (Overtime) Regulations, 1938, dated 31st December, 1938. S.R. & O., 1938. No. 1612.

Ice Cream.—The Ice Cream (Overtime) Regulations, 1939, dated 2nd August, 1939. S.R. & O., 1939. No. 857.

Laundries.—The Laundries (Overtime) Regulations 1938, dated 29th July, 1938. S.R. & O., 1938. No. 728.

Net Mending.—The Net Mending (Overtime) Regulations 1939, dated 19th October, 1939. S.R. & O., 1939. No. 1490.

(b) The Factory Overtime (Separation of Different Parts or Sets) Regulations, 1938, dated 30th June, 1938. S.R. & O., 1938. No. 640.

(c) The Factory (Individual Overtime) Regulations, 1938, dated 10th October, 1938. S.R. & O., 1938. No. 1228.

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The Night Work of Male Young Persons (Medical Examinations) Regulations, 1938, dated 24th June, 1938. S.R. & O. 1938.

The Bread, Flour Confectionery and Sausage Manufacture (Commencement of Employment) Regulations, 1939, dated 4th May, 1939. S.R. & O., 1939. No. 510.

The Factories (Internals for Women and Young Persons) Regulations 1938, dated 24th June, 1938. S.R. & O., 1938. No. 607.

The Factories (Saturday Exception) Regulations, 1940, dated 19th January, 1940. S.R. & O., 1940. No. 109.

The Factories Act Holidays (Different Days for Different Sets) Regulations, 1947, dated 3rd February, 1947. S.R. & O., 1947. No. 184.

The Laundries, Manufacture of Bread etc. (Hours and Intervals) Modification Regulations, 1938, dated 29th July, 1938. S.R. & O., 1938. No. 729.

The Fruit and Vegetable Preserving (Hours of Women and Young Persons) Regulations, 1939, dated 7th June, 1939. S.R. & O., 1939. No. 621.

The Milk and Cheese Factories (Hours of Women and Young Persons) Regulations, 1949. S.I. 1949. No. 35.

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The Home Work (Lampshades) Order, 1929. S.R. & O., 1929. No. 1118.

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3. Making of Chains, Anchors, and Cart Gear.—Order, dated 14th July, 1902. S.R. & O., 1902. No. 561.

4. Making of Felt Hats.—Order, dated 22nd April, 1903. S.R. & O., 1903. No. 334.

5. Various Industries.—Order, dated 23rd May, 1907. S.R. & O., 1907. No. 409.

6. Making of Nets : Peapicking.—Order, dated 23rd May, 1907. S.R. & O., 1907. No. 410.
7. Mixing, Casting, or Manufacture of Brass or of Articles of Brass and the Electro Depositing of Brass.—Order, dated 23rd September, 1907. S.R. & O., 1907. No. 792.
8. Wearing Apparel.—Order, dated 14th September, 1909. S.R. & O., 1909. No. 1027.
9. Manufacture of Cartridges.—Order, dated 15th November, 1909. S.R. & O., 1909. No. 1337.
10. Bleaching and Dyeing.—Order, dated 22nd November, 1909. S.R. & O., 1909. No. 1370.
11. Making of Iron Safes.—Order, dated 29th April, 1911. S.R. & O., 1911. No. 413.
12. Household Linen : Curtains and Furniture Hangings ; Lace.—Order, dated 25th October, 1911. S.R. & O., 1911. No. 1406.
13. Laundries.—Order, dated 23rd December, 1911. S.R. & O., 1911. No. 1294.
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16. Manufacture of Chocolates or Sweetmeats.—Order, dated 27th February, 1912. S.R. & O., 1912. No. 234.
17. Shipbuilding Yards.—Order, dated 23rd August, 1912. S.R. & O., 1912. No. 1297.
18. Iron and Steel Foundries.—Order, dated 30th December, 1913. S.R. & O., 1913. No. 1388.
19. Manufacture or Decoration of Pottery.—Order, dated 31st March, 1922. S.R. & O., 1922. No. 317.
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# **INSTITUTION AWARDS**

---

## **Lord Austin Prize**

This prize consisting of books and/or instruments together with a certificate, is presented annually for the best Essay submitted by a Graduate of the Institution. Details of conditions are published in the Journal each year.

## **Hutchinson Memorial Medal**

A medal is awarded annually for the best paper presented to a Section by a Graduate of the Institution.

## **Institution Medals**

Silver medals are awarded each year for the best paper presented to a Section during the year by (a) a member, and (b) a non-member.

## **Schofield Travel Scholarships**

The Scholarships provide for two Graduates each year to spend six months on industrial study visits in selected overseas countries. Details and conditions of the Award are published each year in the Institution's Journal.

---

# Schneider

## Hydraulic Segmental Wheel

# SURFACE GRINDERS



48in. Model

- Rigid design—built to the most exacting alignments.
- Guides adequately guarded and well lubricated.
- Steplessly variable Hydraulic traverse movement.
- Available in various capacities.

*Other types also available*

**EARLY DELIVERY.**

*Sole Selling Agents*

**NO LICENCE REQUIRED.**



**ELGAR MACHINE TOOL CO., LTD.**

HAMPTON ROAD · HANWORTH · FELTHAM · MIDDLESEX  
PHONE FELTHAM 4266 GRAMS SHIPMENTS FELTHAM

# **F**ASTER **B**ETTER **T**OOLS

## LATHE TOOLS

F.B.T. "SUPERLEDA" high tungsten 10 per cent cobalt steel, flash butt welded to a carbon steel shank, offers the attraction of low initial cost with an extensive range of shapes and shank sizes available from stock.

Correct heat treatment under scientific control ensures that the red hardness characteristics of cobalt high speed steel are shown to maximum advantage.



### HERRAMIENTAS DE TORNO

Las cuchillas de torno F.B.T. "Superleda" de punta de acero rico en tungsteno y 10% de cobalto soldada a tope en un vástago de acero al carbono, ofrece la atracción de un coste inicial bajo con una serie extensa de formas y de tamaños de vástago.

Twist Drills, Reamers, Taps.

Milling Cutters, Lathe Tools  
Chaser Dies, "Mitia"  
Carbide Cutting Tools  
"Mitia" Carbide Saws

Segmental Saws, Saws for all purposes.

Files and Rasps

Hacksaws

"Hardometer" Hardness Testing Machine  
Twist Drill Point Sharpening Machine  
"Crypto Atlas" Bandsawing Machine  
"Mitia" Carbide Saw Sharpening Machine

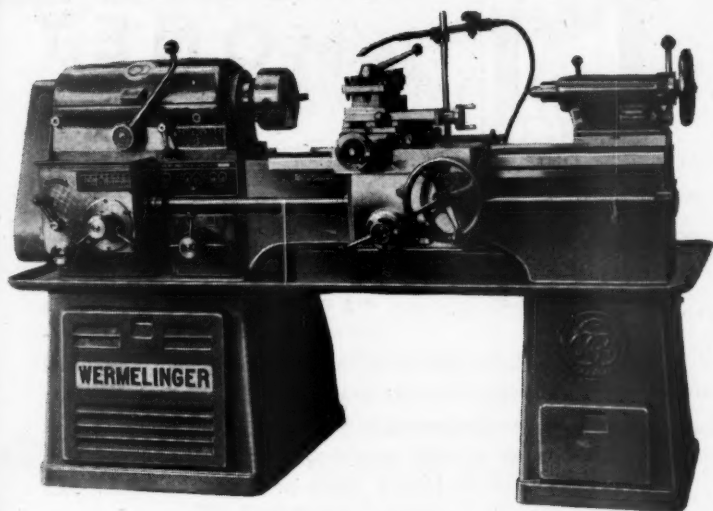
And all other types of Engineers' Cutting Tools

# **F B T**

IRTH BROWN TOOLS LTD.  
SHEFFIELD

# Wermelinger

## High Speed Heavy Duty PRODUCTION LATHE



**Sole Agents:**



Height of centres - - - - - 6½ ins.

Taking between centres - - - - - 30 ins.

Supplied with 27 spindle speeds ranging from 11 to 2120 r.p.m.

8 h.p. motor supplied with the lathe.

**GOOD DELIVERY**

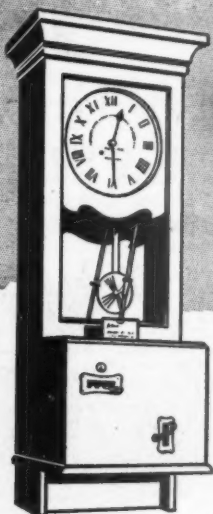
**The Selson Machine Tool Co. Ltd**

CUNARD WORKS, CHASE ROAD, NORTH ACTON, LONDON, N.W.10

Telephone: Ligon 4000 (10 lines) Telegrams: Selsomachi, London

**600**  
GROUP

UPR/519/UMT66



# TIME is MONEY

The Gledhill-Brook Company was intimate with the early problems associated with the design and production of time recording machines, and was first in producing efficient electric impulse recorders with accurate time-

keeping free from dependence on electric frequency or external influence. Wages and cost methods have a time basis—that is where we are concerned to help.

A large number of time recording models is now available covering most of the known needs for wages and labour cost control. One of industry's immediate needs is the reduction of waste—the waste of time that costs money.

# GLD HILL-BROOK

## TIME RECORDERS

GLD HILL-BROOK TIME RECORDERS LIMITED  
20 EMPIRE WORKS

HUDDERSFIELD



## **Look! No hands**

The new Roto-Finish method of barrelling usually saves from 50—80% on production costs by eliminating hand finishing.

Its controlled action removes burrs and sharp corners to close tolerances so that even precision machined parts can be processed in quantity. Components can also be polished ready for plating.

May we send you full details of this process? Better still, send us some of your components, which we will process to your specification without cost or obligation. We will return these with work-load costings showing how savings are achieved.

## **ROTO-FINISH LTD**

(DEPT. B.I. 39 PARK ST., LONDON, W.1  
GROsvenor 6671



THE UNIFORM MECHANICAL PROCESS  
FOR DE-BURRING · POLISHING · HONING



*...on your production programme?*



**W. E. SYKES LTD**

STAINES MIDDLESEX ENGLAND

Tel: Staines 978/1

Grams: "Sykutter, Staines"

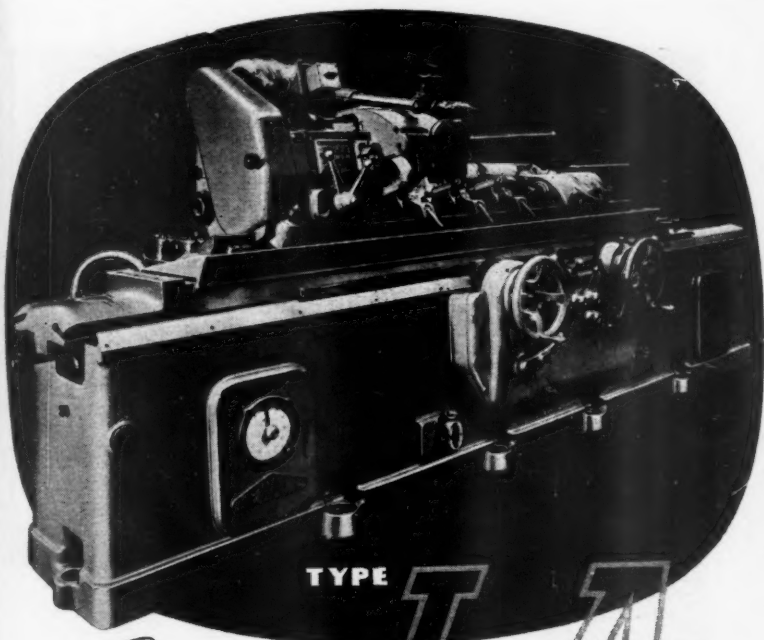
For racks and spur or helical gears—external and internal—the Sykes VIOA Vertical Gear Generator constitutes a remarkably profitable investment. Ease of set-up and simplicity of operation make this the ideal machine for prototype and jobbing work, while its high output capacity makes it equally profitable on continuous production. The vertical construction renders the machine easy to accommodate when floor space is limited.

For Gears up to 14" dia.  
and Racks up to 36" long

Technical specification on request







TYPE

# Grinding machine

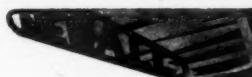
NEWALL "LA" GRINDER CAPACITY 16" x 60"



This Grinder, together with the LA Pin Grinder is being used extensively in the automobile industry today for the rapid production of crankshafts. These 2 machines make a complete production line for finished crankshaft production.

The LA Grinder is available in sizes 10" x 16", 24", 36", 48", 60", 72", 84".

We will be pleased to send full data on these and any other machines in the Newall range.



**NEWALL GROUP SALES LTD.**

PETERBOROUGH THE PETERBOROUGH GROUP  
SOUTH-SEA AGENTS TRIMMING & SUTHERLAND LTD.  
THE NEWALL GROUP SALES LTD.



*There are something like 24,000 species of bees. Vas bees, thin bees, hairy bees, bald bees, black bees, brown bees, and bees with spots. Their range of development varies considerably and it has been found that the less developed species of bees have a short labium which only allows them to take nectar from shallow plants. Bees—like the honey bee and bumble bee—decent types, have long labia, allowing them to reach into the deepest flowers. It's all a question of breeding—those with the highest breeding are perfectly designed to do the job*

## perfectly designed to do the job

The Wild-Barfield Electrode Salt Bath also does the job perfectly. Using different salts for different ranges, temperatures can be maintained between 550°C. and 1350°C. In the high temperature ranges greater rapidity of heating is achieved than by any other method, and the protective nature of the salt ensures a clean finish and freedom from decarburisation. Perfect in fact for pre-heating, hardening, quenching and secondary hardening of high-speed steels; hardening carbon and low alloy steels; cyanide hardening; brazing etc.

## Wild-Barfield *Electric Furnaces*



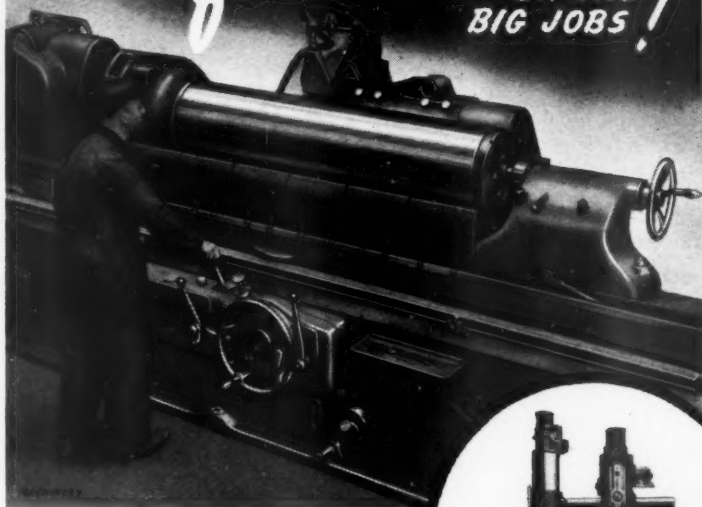
FOR ALL HEAT-TREATMENT PURPOSES

WILD-BARFIELD ELECTRIC FURNACES LTD., ELECPURN WORKS, WATFORD, HERTS. PHONE: WATFORD 6094 (4 LINES)

# 'PRECIMAX'

## for Precision

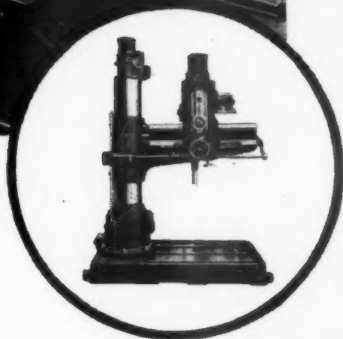
### — ON THE BIG JOBS!



This PRECIMAX mode MPB 28/100 machine is giving excellent results at Kitchen & Wade Ltd., Halifax, on the finish grinding of columns for radial drills. The column illustrated is 14 in. dia. and is ground over a length of 65 in. Tolerances are held to within 0.001 in.

The PRECIMAX range of high precision grinding machines covers all production requirements.

Ask for further details.



*John Lund LTD.*

CROSSHILLS NR. KEIGHLEY

Get rid of that choking, germ-ridden

DUST

...install a Spenstead Dust Extractor

Dust in any form is dangerous. Dangerous to the health of the operator and dangerous to the bearings and slides of machines.

Extraction at source is the only practical means of controlling dust, and "Spenstead" Dust Extracting Units are designed to be taken right up to the job.

Full details of the extensive range of Spenstead Unit Dust Collectors will be sent on request.

*The Spenstead Dwarf Dust Collector.*

**SPENCER & HALSTEAD** *Ltd.*

OSSETT  
*Yorkshire*

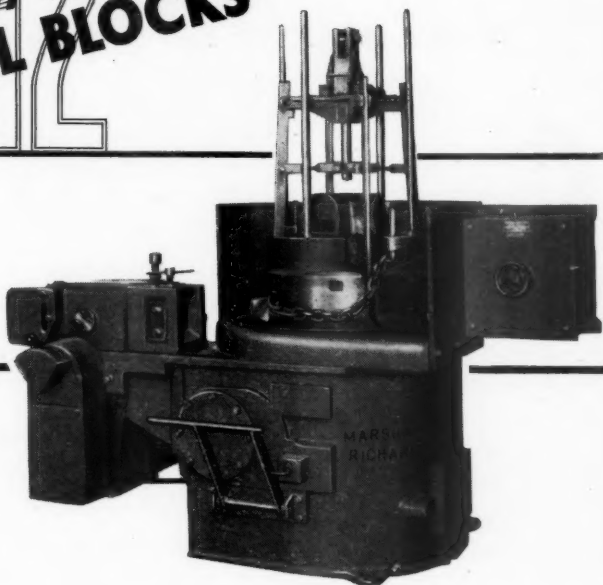
• We extract the DUST from InDUSTry •



**HEAD OFFICE: BRIDGE WORKS, OSSETT** Telephone: Ossett, 353/4  
Also at Epsom, Surrey:—Tel: Epsom 2201. Birmingham, Tel: EDGbaston 1539.  
Glasgow, Tel: CENTral 5909 Manchester, Tel: DENton 2934

# V12

## HIGH SPEED BULL BLOCKS



High Speed on a Vertical Bull block means for example, drawing Mild Steel from 1 S.W.G. to 3 S.W.G. between 400 and 600 feet per minute.

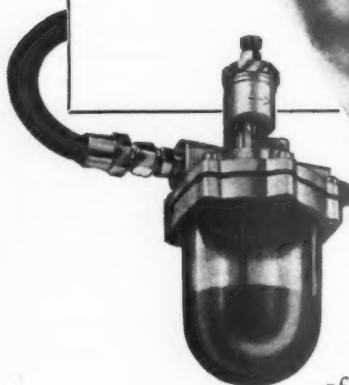
The V.12 shown here will do this and in addition it incorporates many details of design which enable such high speeds to be fully exploited in terms of HIGH CONSISTENT PRODUCTION.



**MARSHALL RICHARDS' MACHINE CO. LTD.**

CROOK, CO. DURHAM. PHONE: CROOK 272

M.R. 19.

**WHAT IS****OIL FOG ?**

Oil fog is a simple method of providing efficient lubrication for air-operated tools, cylinders and equipment, by means of a regulated air-borne oil fog. In use in some of the largest factories in England, it cuts down wear and tear on tools when working, stops corrosion when idle, and operates up to pressures of 250 p.s.i. Oil fog coats all internal parts of equipment reached by air whatever speed they work at. Write or 'phone for further details.

**C. A. NORGREN LTD., SHIPSTON-ON-STOUR, WARWICKSHIRE.**

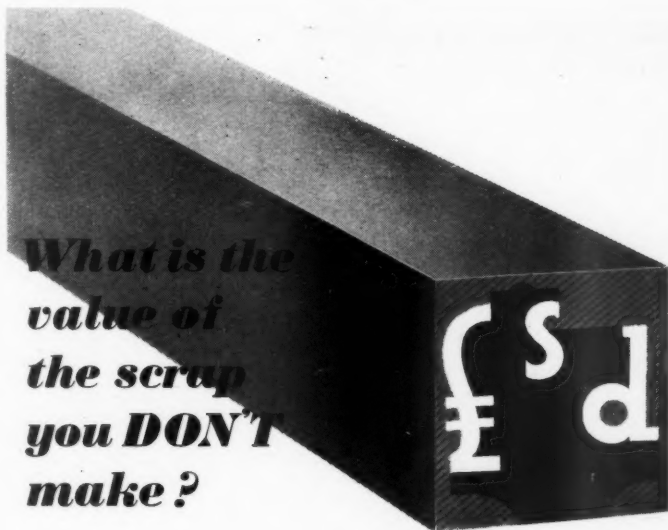
Phone: Shipston-on-Stour 110-106

Full details from: KENT HOUSE, 87, REGENT STREET, LONDON, W.1.

Phone: REGent 2951

M-W. 101

**What is the  
value of  
the scrap  
you *DON'T*  
make?**



The saving in cost by the wider use of extruded sections not only lies in the volume of metal saved, but also in machining time. The number of sections that can be produced is almost limitless. We hold approximately 20,000 dies in stock for customers' requirements. McKechnie extrusions can help you to cut down machining time.

*For details, please write to: 14, Berkeley Street, London W.1.*



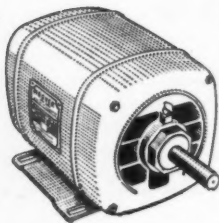
## **EXTRUDED SECTIONS**

**McKECHNIE BROTHERS LTD.** Metal Works: Rotton Park Street, Birmingham, 16.  
Branch Offices: London, Leeds, Manchester, Newcastle-on-Tyne.  
Solder Works: Stratford, London, E.15.  
Copper Sulphate and Lithopone Works: Widnes, Lancs.  
Enquiries for Lithopone and Solder to: 14, Berkeley Street, London, W.1.  
South African Works: McKechnie Brothers S.A. (Pty) Ltd., P.O. Box No. 382, Germiston, S.A.



***“Estos motores  
funcionan magnificamente!”***

**T**HESE motors operate magnificently . . . !”  
Enthusiastic reports arrive at Hoover Limited in a score of different languages to endorse the opinions already held by motor users at home. For the Hoover fractional horse-power motor has proved itself reliable in all climates and working conditions. It is praised everywhere for the efficiency of its contribution to the world's industry and enterprise.



**HOOVER LIMITED**

INDUSTRIAL PRODUCTS DEPARTMENT

CAMBUSLANG • LANARKSHIRE • SCOTLAND





*Welding of 'elevators' for harvesting machinery by Messrs. Fisher and Ludlow Ltd., Erdington*

## Electric Welding

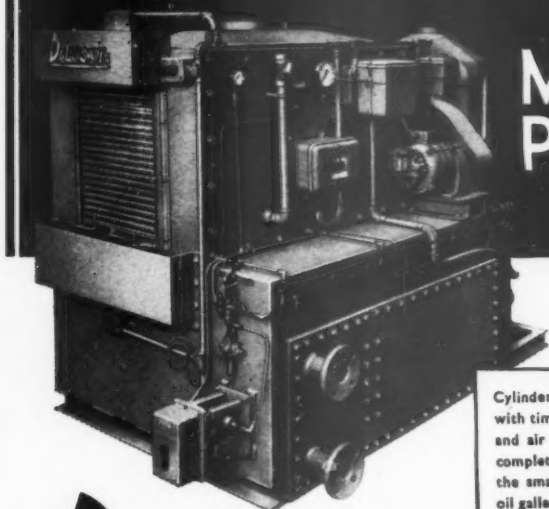
WELDING is one of electricity's most revolutionary processes. Compared with riveting, it shows a man-power saving which is almost incredible. You can build your structure from a plate or sections instead of casting it or machining it from the solid. *Electric welding saves time and power, and greatly increases output.*

**WHERE TO GET MORE INFORMATION**  
Your Electricity Board will be glad to help you to get the utmost value from the available power supply. They can advise you on ways to increase production by using Electricity to greater advantage — on methods which may save time and money, materials and coal, and help to reduce load shedding. Ask your Electricity Board for advice: it is at your disposal at any time.

## Electricity for **PRODUCTIVITY**

*Issued by the British Electrical Development Association*

# Fully Automatic Cleaning of METAL PARTS



Cylinder Block Washer with time cycle for wash and air blast cleans the complete block and all the small tapping holes, oil gallery, cam shaft and main bearings in three minutes.

## ***Dawson***

### INDUSTRIAL WASHING MACHINES FOR ALL BRANCHES OF ENGINEERING

The cleaning of all metal parts between machining operations and before assembly is completely mechanised eliminating hours of tedious and costly manual work and stepping up the rate of production. Dawson Metal Parts Cleaning Machines are supplied to suit every size and type of component from small washers to complete engines.

SOLE

DISTRIBUTORS

**DRUMMOND-ASQUITH (Sales) LTD**  
King Edward House, New Street, Birmingham  
Tel. Midland 3431.

Head Office & Works: **DAWSON BROS. LTD.**, Gomersal, Leeds  
Telephone: Cleckheaton 1080 (5 lines).

London Works: 406, Roding Lane South, Woodford Green, Essex.  
Telephone: Wanstead 7777 (4 lines).



## *An Announcement.*

DUREX ABRASIVES LTD wish to announce that as from June 14th, 1951, the name of the Company has been changed and is now the MINNESOTA MINING & MANUFACTURING COMPANY LTD. The range will in future bear the name of the new Brand-titles listed below, and the kind co-operation of the Trade in the use of the new brand names would be appreciated in future ordering.

Existing high standards in the quality of the products will be maintained, the change is in name only.

## CHANGE OF NAME

"Durexite" Cloth

"Durexite" Cloth Economy Rolls and Sheets

"Hydro-Durexite" Cloth

"Durexite" Fibre Combination Discs

"Durexite" Resin Bond Discs

"Durexsil" Fibre Combination Discs

"Hydro-Durexsil" Cloth

"Hydro-Durexsil" Paper

"Durexsil" Paper

"Durexsil" Cloth

"Durexalo" Paper

to "Three-M-ite" Cloth

to "Three-M-ite" Cloth Elek-tro-cut

to "Wetordry Three-M-ite" Cloth

to 3M Discs Type A

to 3M Discs Type C

to "Tri-M-ite" Fibre Combination Discs

to "Wetordry Tri-M-ite" Cloth

to "Wetordry Tri-M-ite" Paper

to "Tri-M-ite" Paper

to "Tri-M-ite" Cloth

to 3M Production Paper

Distributive Arrangements unchanged. Supplies obtainable from former Durex Brand Distributors.

**CHARLES CHURCHILL & CO. LTD.**,  
Birmingham and Branches

**BURTON GRIFFITHS & CO. LTD.**,  
Birmingham and Branches

**R. W. GREEFF & CO. LTD.**  
London and Manchester

and from the Manufacturers:—

**MINNESOTA MINING & MANUFACTURING COMPANY LTD**

ARDEN ROAD

ADDERLEY PARK

BIRMINGHAM 8



# G.P.A.

**G.P.A. TOOLS & GAUGES LIMITED****HARPER ROAD • WYTHENSHAW • MANCHESTER**  
PHONE WYTHENSHAW 2215. **GRAMS PNEUOOLS, PHONE**

*We can now  
accept your enquiries  
for*

## **JIGS-FIXTURES & GAUGES**

**PRESS TOOLS • MOULDS AND  
SPECIAL PURPOSE MACHINES**

*of all kinds*



Up-to-date shops specially laid out and equipped for making, on a production basis, every type of precision ground gauges; limit snap, form, calliper, taper and special purpose gauge, as well as jigs and fixtures of all kinds, press tools, moulds and special purpose machines. Highest class workmanship and accuracy guaranteed.

**G.P.A. TOOLS & GAUGES LIMITED**

**Guaranteed Precision Accuracy**

*Members of the Gauge & Tool Makers' Association*

# AIR COMPRESSORS



We have standard types for all capacities and pressures and can supply the most efficient and reliable machine for any duty.

**REAVELL & CO. LTD. - IPSWICH**

Telegrams: "Reavell, Ipswich."

Telephone Nos. 2124-5-6

# THE SYMBOL OF POWER IN INDUSTRY for 50 Years



**There is an L.D.C. motor of the correct enclosure, including Flame-proof, for any industrial situation.**

*Illustration: A typical L.D.C. "Blue Bantam", flange mounted, drip proof F.H.P. motor,  $\frac{3}{4}$  h.p., 2850 r.p.m.,*

**LANCASHIRE DYNAMO  
AND CRYPTO (MFG) LTD**

TRAFFORD PARK, MANCHESTER

WILKESON, LONDON N.W.

*This  
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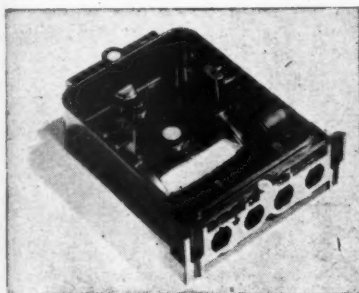
*THE  
STR  
TELL*

# ask your moulder...

*This is the fourth in a series of announcements designed to assist Buyers in purchasing plastics-moulded articles or components.*

Buyers must sometimes be alarmed by the tendency shown by many moulders to alter specified designs. In their efforts to cut prices, to simplify tools and moulding procedures, moulders have been known to make such changes that the resultant mouldings, though no doubt serviceable, were different from what was originally visualised.

You will have your own very good reasons for laying out a design in a certain way, even though it incorporates unorthodox or inconvenient features. You must be guided, of course, by your moulder's advice as to what can or cannot be moulded but his technical skill should be sufficient to enable him to meet your precise requirements.



When you are negotiating with a moulder, therefore, be very careful to ascertain whether his policy is to mould what you want, or to alter your designs to suit his convenience. If a moulder is to prove worthy of your job he should be prepared to exercise his ingenuity to produce it—and to produce it economically—to your specifications.

This does not mean that you should never accept alterations. A good moulder can very often suggest modifications which, without altering the functional purpose of the moulding or detracting from its appearance, can effect a substantial saving of time and money. This point is illustrated in the example given here.

*The problem in this moulding (shown sectioned) was the long undercuts. The design was originally laid out so that the cable fixing and shunt insert holes could be cored from the outside. The resulting holes in the end wall were to be filled afterwards by separate mouldings, glued into position. The moulder tackled the job on the basis of withdrawing the cores inwards. This eliminated the need for separate mouldings and their gluing, with a consequent saving in cost; and improved appearance by ensuring that no joint faces would appear on the outside surfaces. Mouldings by The Streetly Manufacturing Co. Ltd. for Ferranti Ltd.*

## If in doubt, ask **STREETLY**

The Streetly Manufacturing Co. Ltd. makes mouldings in thermosetting and thermoplastic materials and specialises in long runs of the highest quality mouldings. A high percentage of its regular output is of mouldings for manufacturers of electrical equipment and accessories. If you have a moulding job in view, call in Streetly for practical, down-to-earth advice.

THE STREETLY MANUFACTURING COMPANY LIMITED,  
STREETLY, SUTTON COLDFIELD, N.E. BIRMINGHAM  
TELEPHONE: STREETLY 78411. TELEGRAMS: BANG STREETLY



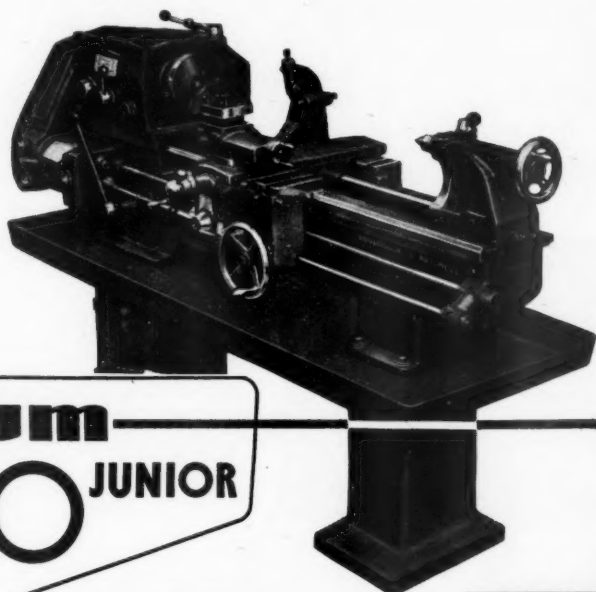
**"Work  
this machine  
faster — she's  
Automatically  
Lubricated"**

**Faster working!** That means increased production ... greater ... much greater output. You *could* get the same results, of course, by working longer hours — but that puts up your costs. No, the solution is to install Tecalemit Centralised Lubrication — fully automatic, semi-automatic or manually operated — which feeds to every bearing the correct amount of oil or grease at the correct intervals of time. Machines can then be worked faster with complete safety; no overheating ... no breakdowns due to faulty lubrication ... just smooth, untroubled running!



A Tecalemit Engineer is available to 'talk lubrication' with you at any time.





**wm**  
**70 JUNIOR**

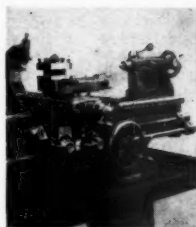
## 7" CENTRE LATHE

The New W. & M. 70 Junior has been developed to provide a robust 7" Centre Lathe suitable for production or for general machine shop service. Simple and straightforward in design, this lathe is rapidly becoming popular because of its easy operation and maintenance.

Briefly, the 70 Junior is worthy of a place in any machine shop where economy of operation, accuracy and reliability are primary considerations.

Complete specification on request.  
Merchants supplied.

Shows saddle and tailstock details. Note liberal bed engagement.



Head stock and feed box with covers removed to show general arrangement.

# WOODHOUSE & MITCHELL

(PROPRIETORS - THOS. W. WARD - LTD)

## WAKEFIELD ROAD · BRIGHOUSE

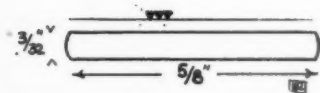
TELEPHONE: BRIGHOUSE 627 (3 LINES) · TELEGRAMS: WOODHOUSE, BRIGHOUSE

WM

# Centreless Grind!



Sole Selling Agents for  
Great Britain and Ireland :  
Alfred Herbert, Ltd.,  
Coventry.



Small cylindrical pieces can be centreless ground at astounding rates of production when fed automatically from a rotary hopper, as in this instance.

<b>PIECE:</b>	Cycle chain pin.
<b>MATERIAL:</b>	Case-hardened steel.
<b>MACHINE:</b>	Scrivener No. 2 Model "D."
<b>OPERATION:</b>	Centreless grind on diameter.
<b>STOCK REMOVAL:</b>	.001"—.002".
<b>PASSES:</b>	1.
<b>TOLERANCES:</b>	Size, $\pm .0001$ "
<b>PRODUCTION:</b>	26,000 per hour, automatic.

**ARTHUR SCRIVENER, LTD., BIRMINGHAM, 24**

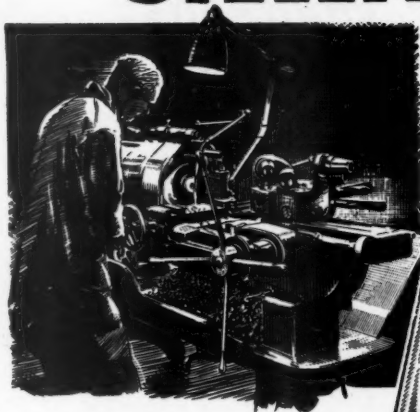
Telephone : ERDington 2274

Telegrams : "Machintool"

**It's Quicker !  
It's Better !!  
It's a Scrivener !!!**

# STELLITE

*for  
Stainless!*



## Stainless Steel—

is an alloy on its own. Machining generates more heat than most alloys and because Stellite does not soften with heat, production can be trebled. Stellite tools are tough to give long life and freedom from chipping, yet their cost is moderate.



Send for leaflets—B2—B3—B4

**DE LORO**  
CUTTING TOOLS



**STELLITE**  
HARD FACING ALLOYS

DE LORO STELLITE LTD., HIGHLANDS ROAD, SHIRLEY, BIRMINGHAM

TELEGRAMS. "STELLITE, B'HAM."

TELEPHONE: SOLIHULL 2254-5-6

166

TIPPED TOOLS

ON CASTINGS

• TOOLBITS • TOOLTIPS • MILLING CUTTER BLADES • HARDFACING ROD • WORKRESTS • PRECISION CASTINGS

## YEARS OF ENDURANCE



### TYPE C28

*A sturdy machine of 200 tons capacity the frame being reinforced with high tensile tie bars. The slide air balancing equipment is concealed in the side members, and it is standard—together with the sensitive pneumatic pedal.*

Through the successive years, your HME Power Presses withstand hard wear and tear, and function efficiently. It is the inherent quality in design, material selection, and final construction that culminates in HME performance and endurance. Our Technical Representative will be pleased to call and discuss your pressing problems.



**HORDERN, MASON & EDWARDS LTD**  
**PYPE HAYES, BIRMINGHAM, 24, ENGLAND**

Telephone: ASHfield 1104 (7 lines)

Telegrams: Altchemmee, Birmingham

London Office: 4 Vernon Place, Southampton Row, W.C.1.

Telephone: HOLborn 1324

**HERBERT****COVENTRY DIEHEADS and DIES** $\frac{1}{4}$ " to  $4\frac{1}{2}$ "

Simple to use, easy to set, using the die-grinding fixture all four dies of a set are sharpened at the same time to the correct cutting angles.

The double-tempered dies are made in 10 types to suit various materials. They will cut clean, accurate threads in all materials that can be threaded.

**LARGE STOCK • PROMPT DELIVERY • EFFICIENT SERVICE**

**ALFRED HERBERT LTD • COVENTRY**

# VSG

Registered Trade Mark



The illustration shows the S.H.8/10 Injection Moulding Machine manufactured by R. H. Windsor Ltd. Equipped with a Size 3/2000 "VSG" Auto Pump, this machine is capable of 200 shots per hour.

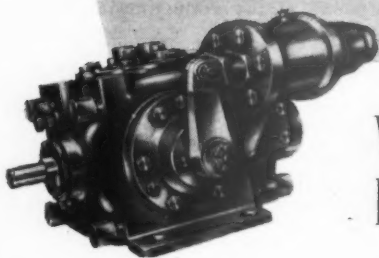
"VSG" Variable Delivery Pumps are axial piston pumps of high volumetric efficiency. They are made in seven sizes delivering from 5 to 360 gallons per minute and in three pressure ranges, namely 1000, 2000 & 3000 p.s.i.

Two main types are available.

The manually controlled variable delivery pump will give constant delivery for any given setting, irrespective of pressure variations.

With the auto-pump, delivery is automatically regulated by the pressure in the hydraulic system.

If you are interested in either of these two types why not ask for full particulars?

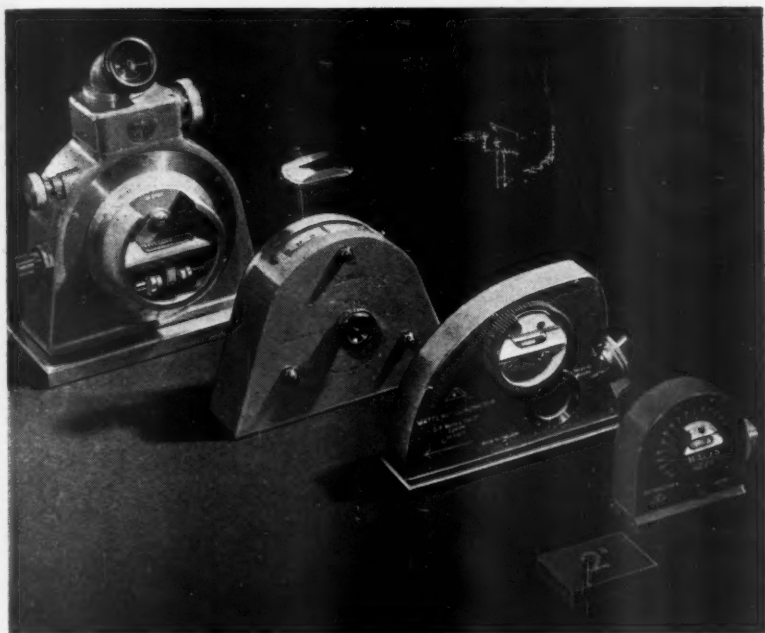


## VARIABLE DELIVERY PUMPS

*All Enquiries to*

**VICKERS-ARMSTRONGS LTD**

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## **ENGINEER'S CLINOMETER**

*Accuracies up to 10 seconds*

*Write for List J.P.E./25*

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**WATTS DIVISION**

**48, Addington Sq., London, S.E.5.**

Members of Export Marketing Company BESTEC.



FATHER OF THE KNIFE-THROWING ACT, WILLIAM TELL demonstrated dramatically the degree of accuracy possible by proper co-ordination of hand and eye. Using a little son, a rosy apple and a bow and arrow he declared he would not hurt a hair of his little son's head as he shot the apple away. This was in thirteen hundred and something, and in nineteen hundred and fifty-one we beg his pardon for punning about his very fine effort. "Hairline accuracy" says in layman's language what the engineer means when he says "accurate to one-tenth of a thou" which is just the kind of accuracy possible on quantity production of all manner of parts in all kinds of materials on . . .

A multitude of parts in metal, glass, plastic, fibre, hard rubber and hardwood can be precision-ground on these versatile machines.

## CINCINNATI Centreless Grinders



CINCINNATI MILLING MACHINES LTD., TYBURN, BIRMINGHAM, 24





## IMPACT STRENGTH

MAZAK components often have to take some hard knocks hence its use for car door striker plates, shock absorber bodies and spring loaded door closures.

MAZAK has a high impact strength, that is one reason why so many stressed parts are die cast in MAZAK.

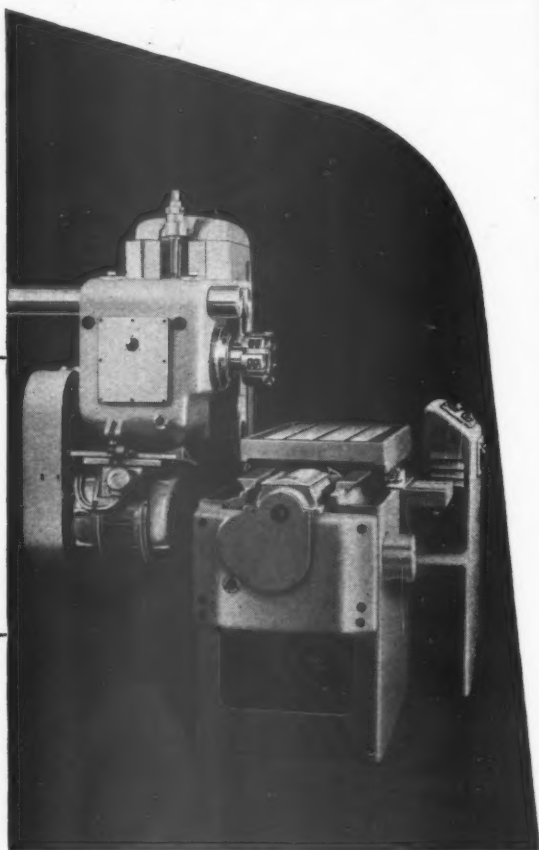
The basis of MAZAK is "Crown Special" Zinc of 99.99+% purity, one of the purest metals commercially available.

# MAZAK

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utmost  
precision*



*F.P.4 Simplex Milling Machine*

***olivetti*** ***machine tools***

***DRILLING • MILLING • GRINDING MACHINES***

Manufactured by Officina Meccanica Olivetti S.p.A., Ivrea, Italy

Enquiries for Great Britain to British Olivetti Ltd., 115 Summerlee Street, Glasgow, E.2

T&W M&S



## ZINC ALLOY DIE CASTING makes all the difference!

A glance will show the improvement in design which resulted from the introduction of zinc alloy die castings for the working parts of this butter churn.\* All the parts above the lid of the glass jar, except the spindles and screws, are die cast in zinc alloy. It is an excellent example of the result of close co-operation between designer and die caster.

Compared with the old cast iron model, the new one is more compact, less liable to breakage, lighter and cheaper.

An improved finish is possible—sprayed aluminium paint being used on this model. And production is simplified because no machining is required.

\*Reproduced by courtesy of J. J. Blow Ltd.

### Some facts about zinc alloy die casting

Speed of production is an outstanding feature of the die casting process—the shortest distance between raw material and finished product. Zinc alloys are the most widely used of all metals for die casting because they yield castings with the following qualities:

**ACCURACY:** Castings can be made practically to finished dimensions and need little or no machining.

**STRENGTH:** Good mechanical properties for stressed components.

**STABILITY:** Close tolerances are maintained throughout the life of the casting.

### British Standard 1004

It is essential that alloys conforming to B.S. 1004 should be specified for all applications.

*The Association welcomes enquiries about the use of zinc alloy die castings. Publications and a list of Members are available on request.*

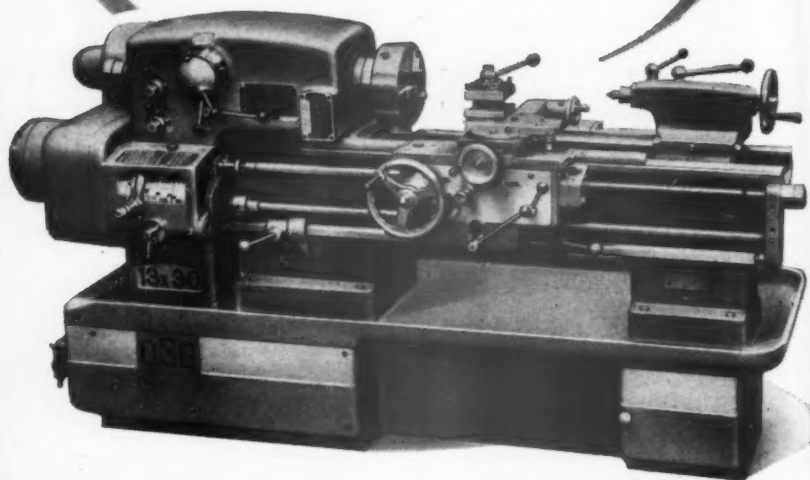
**ZADCA**

**ZINC ALLOY DIE CASTERS ASSOCIATION**

LINCOLN HOUSE, TURL STREET, OXFORD



*have been turning  
the World over  
for 86 years....*



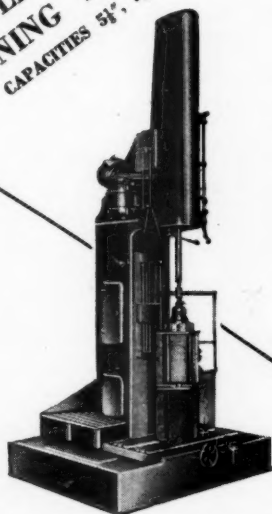
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KEIGHLEY · Limited · ENGLAND

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CAPACITIES 5½", 7½", 8½", 12"



Controlled dwell to eliminate taper and ovality • Hydraulic reciprocating movement with infinitely variable speed • Rapid fine adjustment of stroke for blind holes • Adaptable for multi-station fixtures

As sole British Agents we shall be pleased to advise on your problems.

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AGENCIES DIVISION: TERMINAL  
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Phone: SLOANE 2272 (3 lines)



Knurled micrometer ring for quick and accurate adjustment. Patented release for withdrawal without loss of adjustment.

FOR THESE AND OTHER MACHINES

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ALL OF THESE,  
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of highly rust-resisting  
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*combination  
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REPRODUCES DESIRED  
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HANDLES SHORT LEADS  
AND SMALL DIAMETERS

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CONTROLS DIAMETER  
SIZE AND PROFILE

## ***THE SCRAP ZINC MENACE*** *in die-castings..*



While we appreciate the necessity to recover every pound of the scarce non-ferrous metals, we cannot refrain from reminding users of high quality zinc alloy pressure die castings that the fact still remains that such castings can **ONLY** be produced by using alloys which conform strictly to B.S.S. 1004.

The present tendency to bring into use doubtful alloys makes it more necessary than ever for purchasers of zinc alloy pressure die castings to ensure that the pressure castings which they buy do in fact strictly conform to B.S.S. 1004.

***WOLVERHAMPTON DIE-CASTING CO. LTD.***

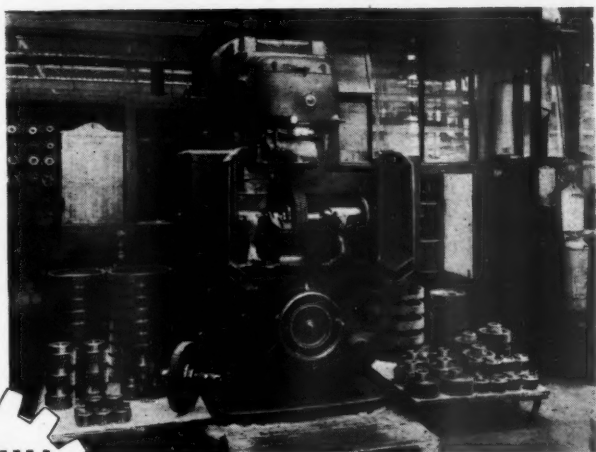
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TELEPHONE: 23831/4 WOLVERHAMPTON

TELEGRAMS: DIECASTINGS, WOLVERHAMPTON



# PREDOMINANT IN GEAR FINISHING



*Photograph by courtesy of Messrs. George Mann & Co. Ltd*

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RED RING  
GEAR  
SHAVERS**

CHARLES  
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GIVE PERFORMANCE WITH ACCURACY**

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take load off your mind



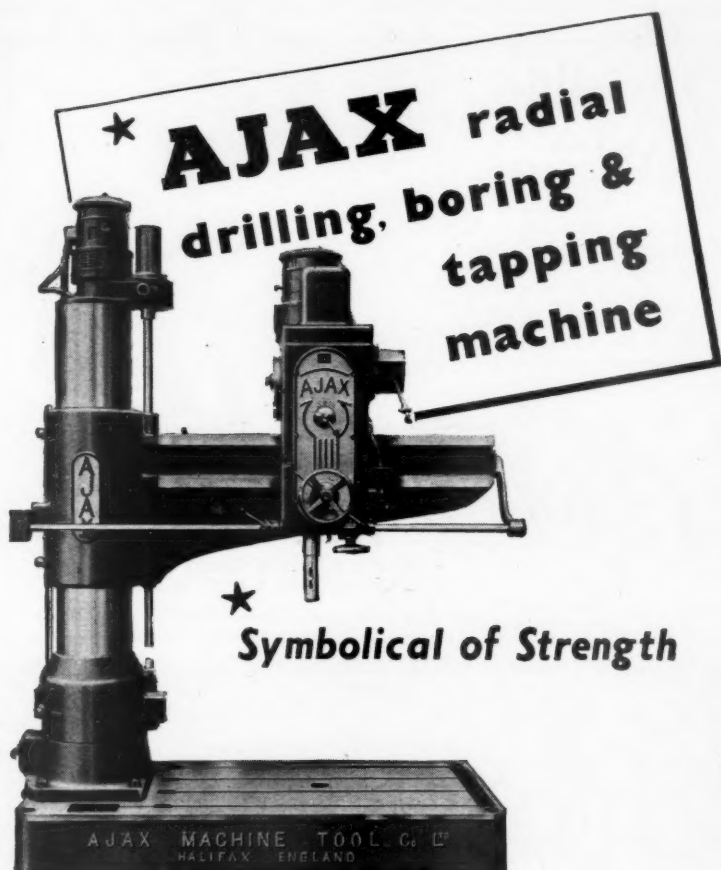
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REDUCE YOUR COSTS**

Why waste money on machining intricate parts? Pressure die-castings by Sparklets are cheaper than machined parts and, being dead accurate, ensure 100% interchangeability and cheaper assembly. Send us the job for free advice and quotation.

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drilling, boring &  
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machine

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HALIFAX ENGLAND

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at each speed 1½" dia. spindle with 14"  
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No friction clutches.

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Proprietors: **ADA (Halifax) Ltd.**

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*is the one that counts*

The load which does not show in the production accounts is the high cost of moving materials by hand, which has been estimated at 15 to 85% of the total production cost. When one man and a CONVEYANCER can comfortably move 300 tons in a working day—

*Can you afford not to use —*

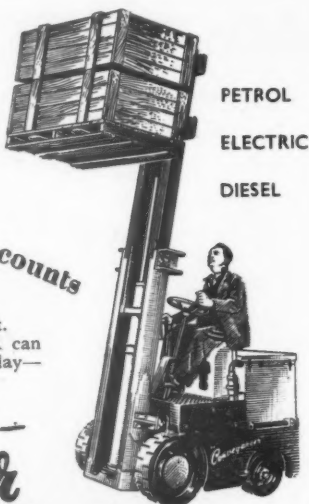
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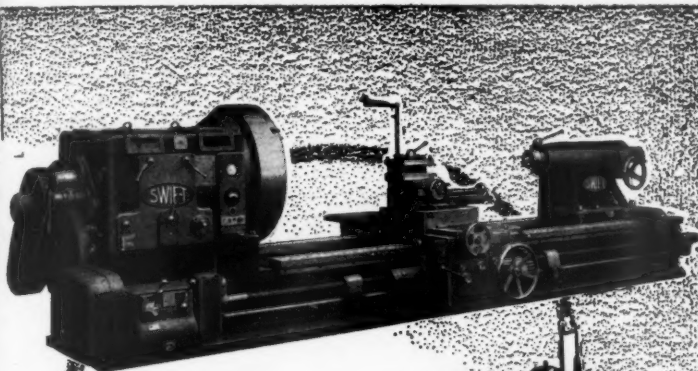
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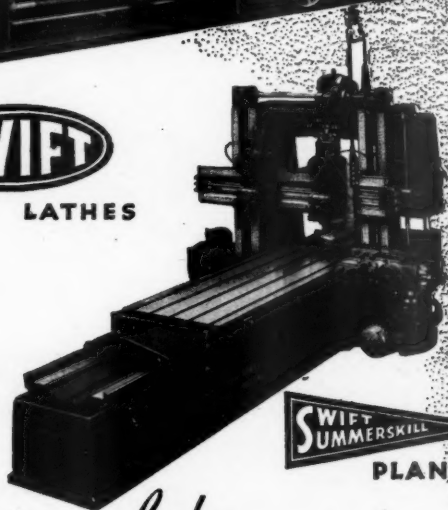
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SWIFT LATHES are built as both Centre Lathes and Surfacing and Boring Lathes, and range from 17in. swing to 72in. swing, with any length desired between centres.

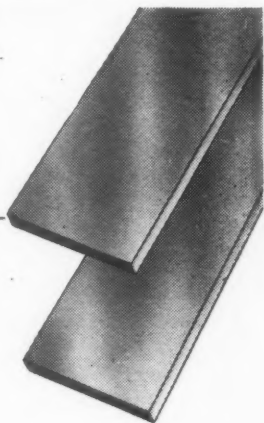
SWIFT-SUMMERSKILL PLANING MACHINES are built from 2ft. 0in. square up to 6ft. 0in. square, of any length of table up to 40ft. 0in., of both Double Column and Openside types, with either all Electric or reversing Two Belt Drive. Special All Electric Feed Motion.

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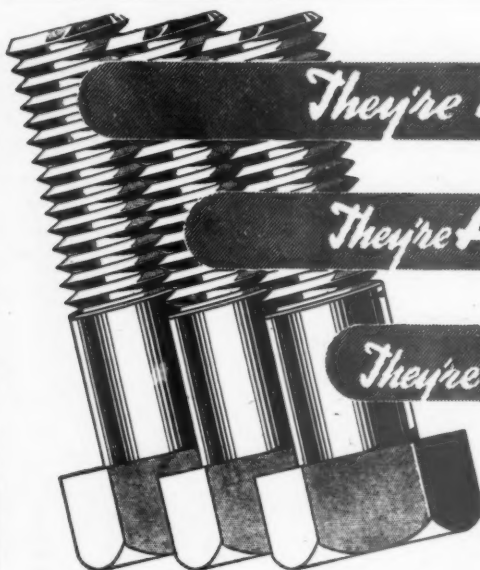
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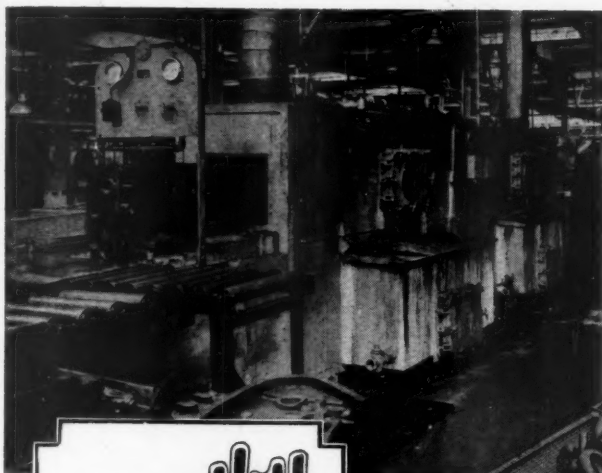
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*Each cleaning problem studied individually*

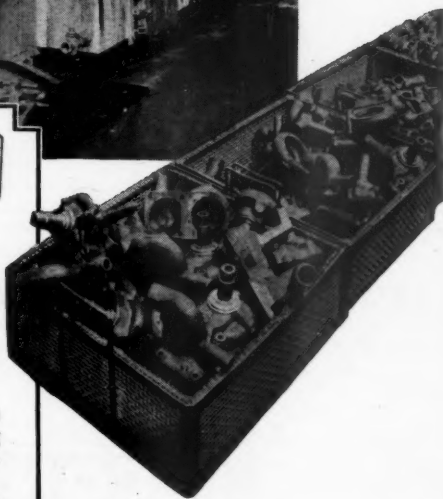


**Bratby**

## INDUSTRIAL CLEANING MACHINES

This illustration shows  
a machine cleaning  
crank cases in the pro-  
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It is equally capable of  
cleaning small parts in  
baskets.



*Photographs by courtesy of "Machinery."*

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*Improve*

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- COMBAT NERVOUS STRAIN
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 10, 25, 250, 1,000 volts.

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 10mA, 100mA, 1 amp, 10 amps.

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 D.C. Voltage ranges : 1,000 ohms per volt.  
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 On D.C., 1% of full scale value.  
 On A.C., to B.S. first-grade.

Various accessories are available for extending the above ranges.

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Protection from the inadvertent application of electrical overload is provided by an automatic cut-out. The action of the overload mechanism is indicated through an aperture in the scale plate, and a small control on the panel renders the meter again ready for use.

Sole Proprietors and Manufacturers:-

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MADE BY  
**GEORGE MORGAN LTD**  
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***It is small-  
but does a man-sized job***

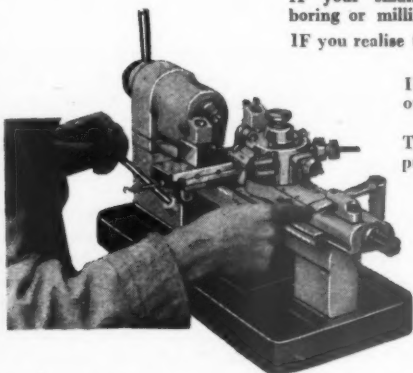
IF your small work includes grinding, turning, boring or milling.

IF you realise the imitations of ordinary machines

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THEN—You need PULTRA Multi-purpose Equipment in your works.

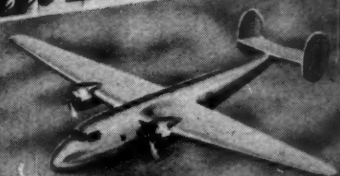
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We have pleasure in introducing a new British designed and British built Cold Chamber Die-Casting Machine.

Model 10c.

## DIE-CASTING MACHINE

The machine is self-contained, hydraulically operated, suitable for hand or semi-automatic operation. The machine is also fitted with hydraulic ejection and provision is made for automatic interlocking core pulling.

Brief details of specification:

- Capacity  $\frac{1}{2}$  lbs (in aluminium)
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- Locking pressure 450 tons
- Platen dimensions 35 $\frac{1}{2}$  in. x 35 in.
- Maximum die space 25 in.

Please ask for full particulars explaining the many interesting features of this machine.

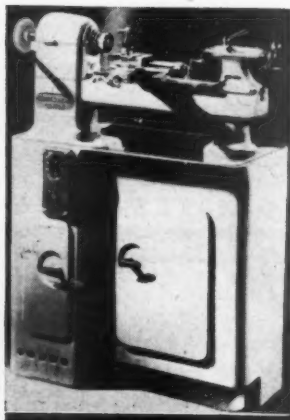


## The PROJECTILE & ENGINEERING Co. Ltd.

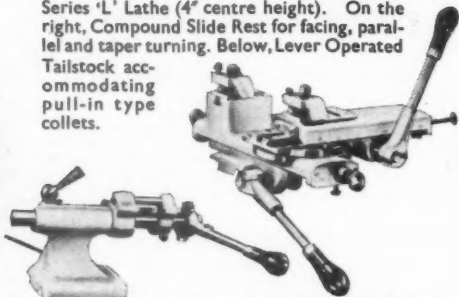
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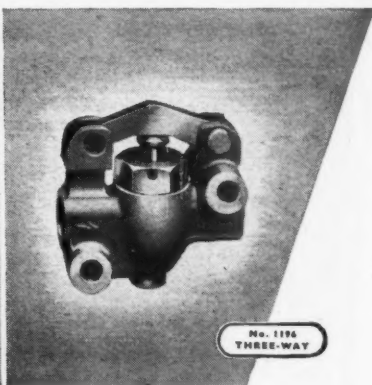
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The efficiency of compressed air depends on the method of using it. Schrader Blow Valves permit air blasts that conform to the cycle of operations of the machines so that the output is increased *automatically* and operator fatigue reduced.

**No. 924M TWO-WAY BLOW VALVE.** For automatic tripping providing a timed air blast. Shuts immediately upon release of the tripping pressure. Correctly timed intermittent air blasts eliminate wastage of air.

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Standard tools  
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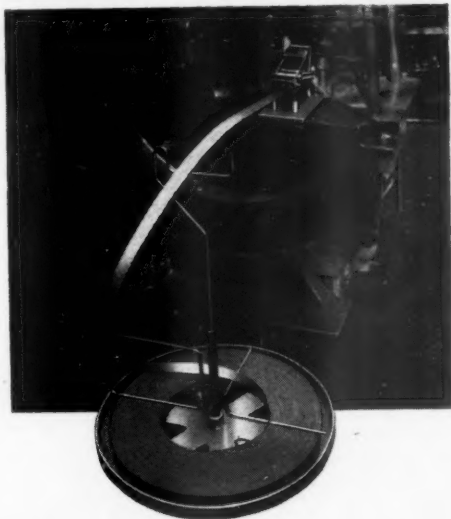
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*Also supplied by our Associated Companies:*

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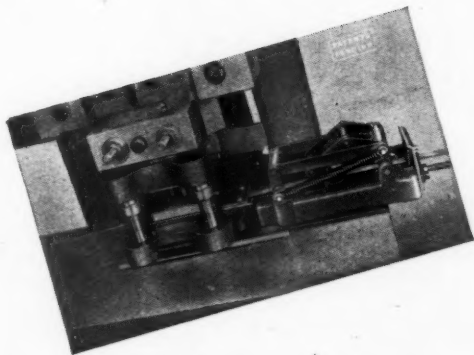
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Material is taken from *centre* of the coil, thus taking advantage of the natural spring of the material eliminating snatch or tightening. Will take coils up to 24 in. dia.



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PRECISION COUNTERS  
SUITABLE FOR SPEEDS UP TO 6,000 R.P.M.

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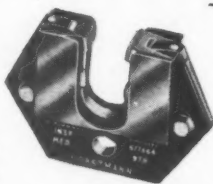
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**B. & F. CARTER & CO. LTD, BOLTON, 10**

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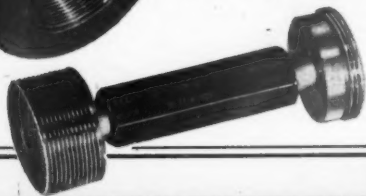


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WHEN we tell people that our Service in Twist Drills is second to none—that we can supply ANY SIZE—ANY LENGTH—EX STOCK—we are met with a look that only means "We don't believe it." After all, to anyone who thinks we are exaggerating we issue a challenge—TEST US. If it's worth while getting to know a firm that can be relied on to fulfil your TWIST DRILL requirements, call on request.

**MONKS & CRANE LTD.**  
Drill Specialist  
BIRMINGHAM  
Althorpe 31

**DELIVERY EX STOCK**  
ANY SIZE—ANY QUANTITY  
Ring (CML) Althorpe 3381



Two years ago we issued this challenging advertisement with knowledge that even in these difficult days, we had the organisation and stock to cope with all demands. Since then Monks & Crane have made remarkable progress—"The Twist Drill Specialists" are now known throughout the engineering industry as "The Small Tools Specialists".

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# 'ARCHER'

## QUICK CHANGE COLLET CHUCK

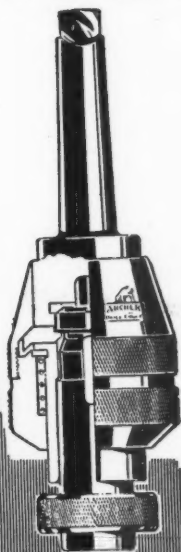
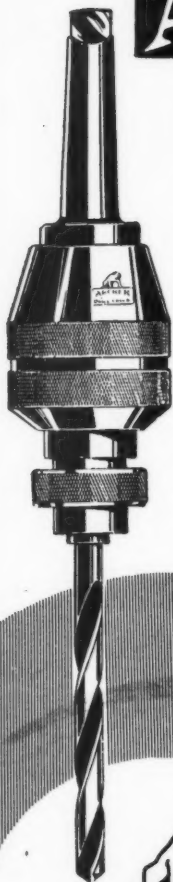
The Latest and Most Modern Quick Change Chuck  
ONE HAND ACTION

NON-STOP change of tools in the quickest possible time. Positive drive from top of collet in direct spindle line. Safety collar on collet for operator's hands. All parts thoroughly hardened and accurately ground ensuring permanent concentricity and long life.

Free movement safety collar on collet protects hands from danger of revolving tool.

Write for Catalogue No. 120

HARDENED ALL OVER  
PERMANENT CONCENTRICITY



**ARCHER**  
SMALL-TOOLS

# FRANK GUYLEE & SON,

'ARCHER' TOOL WORKS,  
MILLHOUSES · SHEFFIELD, 8

*Ltd.*



## DESIGN DETAILS THAT SPELL . . .



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**AIR DELIVERY.** Every compressor which leaves the Holman works delivers, over a long test run, the volume of air claimed as its capacity (at sea level). (Output is practically constant up to 5,000 ft.)

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**VALVES.** Improved designs of the latest types.

**CRANKSHAFT.** Carefully balanced, to eliminate vibration and ensure long bearing life.

**PISTON.** Double-acting differential design.

**ACCESSIBILITY.** All components can be easily removed for inspection and cleaning.

**DRIVE.** Vee Belt pulley fitted as standard, but flat-belt or direct coupling can also be supplied.

Type	Displacement cu. ft./min.	Compressor Speed	Air Pressure lb./sq. in.
ATH8S	80	1000	125
TA13S	130	1200	125
TH.18S	180	1000	125
TH.36S	360	1000	125
TM.60S	612	720	125

*All users of compressed-air power are invited to make full use of the Holman technical advisory service. Detailed specifications and recommendations supplied on request.*

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**Holman**  
CAMBORNE, ENGLAND

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SUBSIDIARY COMPANIES, BRANCHES AND AGENCIES THROUGHOUT THE WORLD HB21

All communications regarding advertisements should be addressed to the Advertising Managers,  
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